# MATLAB®

## The Language of Technical Computing

- Computation
- Visualization
- Programming

# External Interfaces Reference

*Version 7*

The MathWorks

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| 508-647-7001 | Fax |
| The MathWorks, Inc.<br>3 Apple Hill Drive<br>Natick, MA 01760-2098 | Mail |

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*MATLAB External Interfaces Reference*

## Revision History



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| `libfunctions` | Return information on functions in external library |
| `libfunctionsview` | Create window displaying information on functions in external library |
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| `libpointer` | Create pointer object for use with external libraries |
| `libstruct` | Construct structure as defined in external library |
| `loadlibrary` | Load external library into MATLAB® |
| `unloadlibrary` | Unload external library from memory |

# MAT-File Access (C)

| | |
|---|---|
| `matClose` | Close MAT-file |
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| `matPutArray (Obsolete)` | Use `matPutVariable` |
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| `matPutString (Obsolete)` | Use `mxCreateString` and `matPutVariable` |

| | |
|---|---|
| `matPutVariable` | Write `mxArrays` into MAT-files |
| `matPutVariableAsGlobal` | Put `mxArrays` into MAT-files |

**Purpose** Close MAT-file

**C Syntax**

```
#include "mat.h"
int matClose(MATFile *mfp);
```

**Arguments**

`mfp`
Pointer to MAT-file information.

**Description**

`matClose` closes the MAT-file associated with `mfp`. It returns `EOF` for a write error, and zero if successful.

**Examples**

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

# matDeleteArray (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matDeleteVariable(mfp, name)
```

instead of

```
matDeleteArray(mfp, name)
```

**See Also**

`matDeleteVariable`

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
matDeleteVariable(mfp, name)
```

instead of

```
matDeleteMatrix(mfp, name)
```

## See Also

`matDeleteVariable`

# matDeleteVariable

**Purpose** Delete named mxArray from MAT-file

**C Syntax**

```
#include "mat.h"
int matDeleteVariable(MATFile *mfp, const char *name);
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray` to delete.

**Description** `matDeleteVariable` deletes the named `mxArray` from the MAT-file pointed to by `mfp`. `matDeleteVariable` returns 0 if successful, and nonzero otherwise.

**Examples** See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mp = matGetVariable(mfp, name);
```

instead of

```
mp = matGetArray(mfp, name);
```

## See Also

`matGetVariable`

# matGetArrayHeader (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mp = matGetVariableInfo(mfp, name);
```

instead of

```
mp = matGetArrayHeader(mfp, name);
```

**See Also**

`matGetVariableInfo`

**Purpose**

Get directory of mxArrays in MAT-file

**C Syntax**

```
#include "mat.h"
char **matGetDir(MATFile *mfp, int *num);
```

**Arguments**

mfp
Pointer to MAT-file information.

num
Address of the variable to contain the number of mxArrays in the MAT-file.

**Description**

This routine allows you to get a list of the names of the mxArrays contained within a MAT-file.

matGetDir returns a pointer to an internal array containing pointers to the NULL-terminated names of the mxArrays in the MAT-file pointed to by mfp. The length of the internal array (number of mxArrays in the MAT-file) is placed into num. The internal array is allocated using a single mxCalloc and must be freed using mxFree when you are finished with it.

matGetDir returns NULL and sets num to a negative number if it fails. If num is zero, mfp contains no arrays.

MATLAB variable names can be up to length mxMAXNAM, where mxMAXNAM is defined in the file matrix.h.

**Examples**

See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

# matGetFp

**Purpose**

Get file pointer to MAT-file

**C Syntax**

```
#include "mat.h"
FILE *matGetFp(MATFile *mfp);
```

**Arguments**

`mfp`
Pointer to MAT-file information.

**Description**

`matGetFp` returns the C file handle to the MAT-file with handle `mfp`. This can be useful for using standard C library routines like `ferror()` and `feof()` to investigate error situations.

**Examples**

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`matGetVariable` followed by the appropriate `mxGet` routines

instead of

`matGetFull`

For example,

```
int matGetFull(MATFile *fp, char *name, int *m, int *n,
               double **pr, double **pi)
{
    mxArray *parr;
    /* Get the matrix. */
    parr = matGetVariable(fp, name);

    if (parr == NULL)
       return(1);

    if (!mxIsDouble(parr)) {
       mxDestroyArray(parr);
       return(1);
    }
    /* Set up return args. */

    *m  = mxGetM(parr);
    *n  = mxGetN(parr);
    *pr = mxGetPr(parr);
    *pi = mxGetPi(parr);
    /* Zero out pr & pi in array struct so the mxArray can be
       destroyed. */
    mxSetPr(parr, (void *)0);
    mxSetPi(parr, (void *)0);

    mxDestroyArray(parr);

    return(0);
}
```

# matGetFull (Obsolete)

**See Also** matGetVariable

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mp = matGetVariable(mfp, name)
```

instead of

```
mp = matGetMatrix(mfp, name);
```

## See Also

`matGetVariable`

# matGetNextArray (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mp = matGetNextVariable(mfp, name);
```

instead of

```
mp = matGetNextArray(mfp);
```

**See Also**

`matGetNextVariable`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matGetNextVariableInfo
```

instead of

```
matGetNextArrayHeader
```

**See Also**

`matGetNextVariableInfo`

# matGetNextMatrix (Obsolete)

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
matGetNextVariable
```

instead of

```
matGetNextMatrix
```

**See Also** `matGetNextVariable`

**Purpose** Read next `mxArray` from MAT-file

**C Syntax**

```
#include "mat.h"
mxArray *matGetNextVariable(MATFile *mfp, const char *name);
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Address of the variable to contain the `mxArray` name.

**Description**

`matGetNextVariable` allows you to step sequentially through a MAT-file and read all the `mxArrays` in a single pass. The function reads the next `mxArray` from the MAT-file pointed to by `mfp` and returns a pointer to a newly allocated `mxArray` structure. MATLAB returns the name of the `mxArray` in `name`.

Use `matGetNextVariable` immediately after opening the MAT-file with `matOpen` and not in conjunction with other MAT-file routines. Otherwise, the concept of the *next* `mxArray` is undefined.

`matGetNextVariable` returns `NULL` when the end-of-file is reached or if there is an error condition. Use `feof` and `ferror` from the Standard C Library to determine status.

Be careful in your code to free the `mxArray` created by this routine when you are finished with it.

**Examples**

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

# matGetNextVariableInfo

**Purpose** Load array header information only

**C Syntax**

```
#include "mat.h"
mxArray *matGetNextVariableInfo(MATFile *mfp, const char *name);
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Address of the variable to contain the `mxArray` name.

**Description**

`matGetNextVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`, from the file's current file offset. MATLAB returns the name of the `mxArray` in `name`.

If `pr`, `pi`, `ir`, and `jc` are set to nonzero values when loaded with `matGetVariable`, `matGetNextVariableInfo` sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

**Examples**

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

**See Also**

`matGetNextVariable`, `matGetVariableInfo`

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
#include "mat.h"
#include "matrix.h"
mxArray *matGetVariable(MATFile *mfp, const char *name);
int mxGetString(const mxArray *array_ptr, char *buf, int buflen)
```

instead of

```
matGetString
```

## See Also

`matGetVariable`, `mxGetString`

# matGetVariable

## Purpose

Read mxArrays from MAT-files

## C Syntax

```
#include "mat.h"
mxArray *matGetVariable(MATFile *mfp, const char *name);
```

## Arguments

mfp
Pointer to MAT-file information.

name
Name of mxArray to get from MAT-file.

## Description

This routine allows you to copy an mxArray out of a MAT-file.

matGetVariable reads the named mxArray from the MAT-file pointed to by mfp and returns a pointer to a newly allocated mxArray structure, or NULL if the attempt fails.

Be careful in your code to free the mxArray created by this routine when you are finished with it.

## Examples

See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

**Purpose**

Load array header information only

**C Syntax**

```
#include "mat.h"
mxArray *matGetVariableInfo(MATFile *mfp, const char *name);
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray`.

**Description**

`matGetVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`. It recursively creates the cells and structures through their leaf elements, but does not include `pr`, `pi`, `ir`, and `jc`.

If `pr`, `pi`, `ir`, and `jc` are set to non`NULL` when loaded with `matGetVariable`, then `matGetVariableInfo` sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

**Examples**

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

**See Also**

`matGetVariable`

# matOpen

## Purpose

Open MAT-file

## C Syntax

```
#include "mat.h"
MATFile *matOpen(const char *filename, const char *mode);
```

## Arguments

`filename`
Name of file to open.

`mode`
File opening mode. Valid values for `mode` are:

| | |
|---|---|
| `r` | Open file for reading only; determines the current version of the MAT-file by inspecting the files and preserves the current version. |
| `u` | Open file for update, both reading and writing, but does not create the file if the file does not exist (equivalent to the `r+` mode of `fopen`); determines the current version of the MAT-file by inspecting the files and preserves the current version. |
| `w` | Open file for writing only; deletes previous contents, if any. |
| `w4` | Create a Level 4 MAT-file, compatible with MATLAB Versions 4 and earlier. |
| `wL` | Open file for writing character data using the default character set for your system. The resulting MAT-file can be read with MATLAB version 6 or 6.5.<br>If you do not use the `wL` mode switch, MATLAB writes character data to the MAT-file using Unicode character encoding by default. |
| `wz` | Open file for writing compressed data. |

## Description

This routine allows you to open MAT-files for reading and writing.

`matOpen` opens the named file and returns a file handle, or `NULL` if the open fails.

See “Writing Character Data” in the External Interfaces documentation for more information on how MATLAB uses character encodings.

**Examples**

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

# matPutArray (Obsolete)

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matPutVariable(mfp, name, mp);
```

instead of

```
mxSetName(mp, name);
matPutArray(mfp, mp);
```

## See Also

`matPutVariable`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matPutVariableAsGlobal
```

instead of

```
matPutArrayAsGlobal
```

**See Also**

`matPutVariableAsGlobal`

# matPutFull (Obsolete)

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`mxCreateDoubleMatrix` and `matPutVariable`

instead of

`matPutFull`

For example,

```
int matPutFull(MATFile*ph, char *name, int m, int n, double *pr,
               double *pi)
{
   int         retval;
   mxArray     *parr;

   /* Get empty array struct to place inputs into. */
   parr = mxCreateDoubleMatrix(0, 0, 0);
   if (parr == NULL)
       return(1);

   /* Place inputs into array struct. */
   mxSetM(parr, m);
   mxSetN(parr, n);
   mxSetPr(parr, pr);
   mxSetPi(parr, pi);

   /* Use put to place array on file. */
   retval = matPutVariable(ph, name, parr);

   /* Zero out pr & pi in array struct so the mxArray can be
      destroyed. */
   mxSetPr(parr, (void *)0);
   mxSetPi(parr, (void *)0);

   mxDestroyArray(parr);

   return(retval);
}
```

**See Also** `mxCreateDoubleMatrix`, `matPutVariable`

# matPutMatrix (Obsolete)

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
matPutVariable
```

instead of

```
matPutMatrix
```

**See Also** `matPutVariable`

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
#include "matrix.h"
#include "mat.h"
mp = mxCreateString(str);
matPutVariable(mfp, name, mp);
mxDestroyArray(mp);
```

instead of

```
matPutString(mfp, name, str);
```

## See Also

`matPutVariable`

# matPutVariable

**Purpose**

Write mxArrays to MAT-files

**C Syntax**

```
#include "mat.h"
int matPutVariable(MATFile *mfp, const char *name, const mxArray
   *mp);
```

**Arguments**

mfp
Pointer to MAT-file information.

name
Name of mxArray to put into MAT-file.

mp
mxArray pointer.

**Description**

This routine allows you to put an mxArray into a MAT-file.

matPutVariable writes mxArray mp to the MAT-file mfp. If the mxArray does not exist in the MAT-file, it is appended to the end. If an mxArray with the same name already exists in the file, the existing mxArray is replaced with the new mxArray by rewriting the file. The size of the new mxArray can be different than the existing mxArray.

matPutVariable returns 0 if successful and nonzero if an error occurs. Use feof and ferror from the Standard C Library along with matGetFp to determine status.

**Examples**

See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

**Purpose**

Put mxArrays into MAT-files as originating from global workspace

**C Syntax**

```
#include "mat.h"
int matPutVariableAsGlobal(MATFile *mfp, const char *name, const
   mxArray *mp);
```

**Arguments**

mfp
Pointer to MAT-file information.

name
Name of mxArray to put into MAT-file.

mp
mxArray pointer.

**Description**

This routine allows you to put an mxArray into a MAT-file. matPutVariableAsGlobal is similar to matPutVariable, except the array, when loaded by MATLAB, is placed into the global workspace and a reference to it is set in the local workspace. If you write to a MATLAB 4 format file, matPutVariableAsGlobal will not load it as global, and will act the same as matPutVariable.

matPutVariableAsGlobal writes mxArray mp to the MAT-file mfp. If the mxArray does not exist in the MAT-file, it is appended to the end. If an mxArray with the same name already exists in the file, the existing mxArray is replaced with the new mxArray by rewriting the file. The size of the new mxArray can be different than the existing mxArray.

matPutVariableAsGlobal returns 0 if successful and nonzero if an error occurs. Use feof and ferror from the Standard C Library with matGetFp to determine status.

**Examples**

See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

# MX Array Manipulation (C)

| | |
|---|---|
| `mxAddField` | Add field to structure array |
| `mxArrayToString` | Convert array to string |
| `mxAssert` | Check assertion value |
| `mxAssertS` | Check assertion value without printing assertion text |
| `mxCalcSingleSubscript` | Return offset from first element to desired element |
| `mxCalloc` | Allocate dynamic memory |
| `mxChar` | Data type for string `mxArray` |
| `mxClassID` | Integer value that identifies class of `mxArray` |
| `mxClearLogical (Obsolete)` | Clear logical flag |
| `mxComplexity` | Specifies if `mxArray` has imaginary components |
| `mxCreateCellArray` | Create unpopulated N-dimensional cell `mxArray` |
| `mxCreateCellMatrix` | Create unpopulated two-dimensional cell `mxArray` |
| `mxCreateCharArray` | Create unpopulated N-dimensional string `mxArray` |
| `mxCreateCharMatrixFromStrings` | Create populated two-dimensional string `mxArray` |
| `mxCreateDoubleMatrix` | Create unpopulated two-dimensional, double-precision, floating-point `mxArray` |
| `mxCreateDoubleScalar` | Create scalar, double-precision array initialized to specified value |
| `mxCreateLogicalArray` | Create N-dimensional, logical `mxArray` initialized to `false` |
| `mxCreateLogicalMatrix` | Create two-dimensional, logical `mxArray` initialized to `false` |
| `mxCreateLogicalScalar` | Create scalar, logical `mxArray` initialized to `false` |
| `mxCreateFull (Obsolete)` | Use `mxCreateDoubleMatrix` |
| `mxCreateNumericArray` | Create unpopulated N-dimensional numeric `mxArray` |
| `mxCreateNumericMatrix` | Create numeric matrix and initialize data elements to 0 |

| | |
|---|---|
| `mxCreateScalarDouble` | Create scalar, double-precision array initialized to specified value |
| `mxCreateSparse` | Create two-dimensional unpopulated sparse `mxArray` |
| `mxCreateSparseLogicalMatrix` | Create unpopulated, two-dimensional, sparse, logical `mxArray` |
| `mxCreateString` | Create 1-by-n string `mxArray` initialized to specified string |
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| `mxCreateStructMatrix` | Create unpopulated two-dimensional structure `mxArray` |
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| `mxFree` | Free dynamic memory allocated by `mxCalloc` |
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| `mxGetData` | Get pointer to data |
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| `mxGetField` | Get field value, given field name and index in structure array |
| `mxGetFieldByNumber` | Get field value, given field number and index in structure array |
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| `mxGetInf` | Get value of infinity |

| | |
|---|---|
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| `mxGetJc` | Get `jc` array of sparse matrix |
| `mxGetLogicals` | Get pointer to logical array data |
| `mxGetM` | Get number of rows |
| `mxGetN` | Get number of columns or number of elements |
| `mxGetName (Obsolete)` | Get name of specified `mxArray` |
| `mxGetNaN` | Get the value of `NaN` |
| `mxGetNumberOfDimensions` | Get number of dimensions |
| `mxGetNumberOfElements` | Get number of elements in array |
| `mxGetNumberOfFields` | Get number of fields in structure `mxArray` |
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| `mxGetPi` | Get imaginary data elements of `mxArray` |
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| `mxGetScalar` | Get real component of first data element in `mxArray` |
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| `mxIsEmpty` | Determine if `mxArray` is empty |
| `mxIsFinite` | Determine if input is finite |
| `mxIsFromGlobalWS` | Determine if `mxArray` was copied from the MATLAB global workspace |
| `mxIsFull (Obsolete)` | Use `mxIsSparse` |
| `mxIsInf` | Determine if input is infinite |

| | |
|---|---|
| `mxIsInt8` | Determine if `mxArray` represents data as signed 8-bit integers |
| `mxIsInt16` | Determine if `mxArray` represents data as signed 16-bit integers |
| `mxIsInt32` | Determine if `mxArray` represents data as signed 32-bit integers |
| `mxIsInt64` | Determine if `mxArray` represents data as signed 64-bit integers |
| `mxIsLogical` | Determine if `mxArray` is Boolean |
| `mxIsLogicalScalar` | Determine if input is scalar `mxArray` of class `mxLogical` |
| `mxIsLogicalScalarTrue` | Determine if scalar `mxArray` of class `mxLogical` is `true` |
| `mxIsNaN` | Determine if input is `NaN` |
| `mxIsNumeric` | Determine if `mxArray` is numeric |
| `mxIsSingle` | Determine if `mxArray` represents data as single-precision, floating-point numbers |
| `mxIsSparse` | Determine if input is sparse `mxArray` |
| `mxIsString (Obsolete)` | Use `mxIsChar` |
| `mxIsStruct` | Determine if input is structure `mxArray` |
| `mxIsUint8` | Determine if `mxArray` represents data as unsigned 8-bit integers |
| `mxIsUint16` | Determine if `mxArray` represents data as unsigned 16-bit integers |
| `mxIsUint32` | Determine if `mxArray` represents data as unsigned 32-bit integers |
| `mxIsUint64` | Determine if `mxArray` represents data as unsigned 64-bit integers |
| `mxMalloc` | Allocate dynamic memory using the MATLAB memory manager |
| `mxRealloc` | Reallocate memory |
| `mxRemoveField` | Remove field from structure array |

| | |
|---|---|
| `mxSetCell` | Set value of one cell |
| `mxSetClassName` | Convert MATLAB structure array to MATLAB object array |
| `mxSetData` | Set pointer to data |
| `mxSetDimensions` | Modify number/size of dimensions |
| `mxSetField` | Set field value of structure array, given field name/index |
| `mxSetFieldByNumber` | Set field value in structure array, given field number/index |
| `mxSetImagData` | Set imaginary data pointer for `mxArray` |
| `mxSetIr` | Set `ir` array of sparse `mxArray` |
| `mxSetJc` | Set `jc` array of sparse `mxArray` |
| `mxSetLogical (Obsolete)` | Set logical flag |
| `mxSetM` | Set number of rows |
| `mxSetN` | Set number of columns |
| `mxSetName (Obsolete)` | Set name of `mxArray` |
| `mxSetNzmax` | Set storage space for nonzero elements |
| `mxSetPi` | Set new imaginary data for `mxArray` |
| `mxSetPr` | Set new real data for `mxArray` |

# mxAddField

## Purpose

Add field to structure array

## C Syntax

```
#include "matrix.h"
extern int mxAddField(mxArray array_ptr, const char *field_name);
```

## Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`field_name`
The name of the field you want to add.

## Returns

Field number on success or -1 if inputs are invalid or an out of memory condition occurs.

## Description

Call `mxAddField` to add a field to a structure array. You must then create the values with the `mxCreate*` functions and use `mxSetFieldByNumber` to set the individual values for the field.

## See Also

`mxRemoveField`, `mxSetFieldByNumber`

**Purpose** Convert array to string

**C Syntax**

```
#include "matrix.h"
char *mxArrayToString(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to a string `mxArray`; that is, a pointer to an `mxArray` having the `mxCHAR_CLASS` class.

**Returns** A C-style string. Returns `NULL` on out of memory.

**Description**

Call `mxArrayToString` to copy the character data of a string `mxArray` into a C-style string. The C-style string is always terminated with a `NULL` character.

If the string array contains several rows, they are copied, one column at a time, into one long string array. This function is similar to `mxGetString`, except that:

- It does not require the length of the string as an input.
- It supports multibyte character sets.

`mxArrayToString` does not free the dynamic memory that the `char` pointer points to. Consequently, you should typically free the string (using `mxFree`) immediately after you have finished using it.

**Examples**

See `mexatexit.c` in the `mex` subdirectory of the `examples` directory.

For additional examples, see `mxcreatecharmatrixfromstr.c` and `mxislogical.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxCreateCharArray`, `mxCreateCharMatrixFromStrings`, `mxCreateString`, `mxGetString`

# mxAssert

**Purpose**

Check assertion value for debugging purposes

**C Syntax**

```
#include "matrix.h"
void mxAssert(int expr, char *error_message);
```

**Arguments**

`expr`
Value of assertion.

`error_message`
Description of why assertion failed.

**Description**

Similar to the ANSI C `assert()` macro, `mxAssert` checks the value of an assertion, and continues execution only if the assertion holds. If `expr` evaluates to logical `1` (`true`), `mxAssert` does nothing. If `expr` evaluates to logical `0` (`false`), `mxAssert` prints an error to the MATLAB command window consisting of the failed assertion's expression, the filename and line number where the failed assertion occurred, and the `error_message` string. The `error_message` string allows you to specify a better description of why the assertion failed. Use an empty string if you don't want a description to follow the failed assertion message.

After a failed assertion, control returns to the MATLAB command line.

Note that the MEX script turns off these assertions when building optimized MEX-functions, so you should use this for debugging purposes only. Build the mex file using the syntax, `mex -g filename`, in order to use `mxAssert`.

Assertions are a way of maintaining internal consistency of logic. Use them to keep yourself from misusing your own code and to prevent logical errors from propagating before they are caught; do not use assertions to prevent users of your code from misusing it.

Assertions can be taken out of your code by the C preprocessor. You can use these checks during development and then remove them when the code works properly, letting you use them for troubleshooting during development without slowing down the final product.

## Purpose

Check assertion value without printing assertion text

## C Syntax

```
#include "matrix.h"
void mxAssertS(int expr, char *error_message);
```

## Arguments

`expr`
Value of assertion.

`error_message`
Description of why assertion failed.

## Description

Similar to `mxAssert`, except `mxAssertS` does not print the text of the failed assertion. `mxAssertS` checks the value of an assertion, and continues execution only if the assertion holds. If `expr` evaluates to logical `1` (`true`), `mxAssertS` does nothing. If `expr` evaluates to logical `0` (`false`), `mxAssertS` prints an error to the MATLAB command window consisting of the filename and line number where the assertion failed and the `error_message` string. The `error_message` string allows you to specify a better description of why the assertion failed. Use an empty string if you don't want a description to follow the failed assertion message.

After a failed assertion, control returns to the MATLAB command line.

Note that the `mex` script turns off these assertions when building optimized MEX-functions, so you should use this for debugging purposes only. Build the mex file using the syntax, `mex -g filename`, in order to use `mxAssert`.

**Purpose**

Return offset from first element to desired element

**C Syntax**

```
#include <matrix.h>
int mxCalcSingleSubscript(const mxArray *array_ptr, int nsubs,
    int *subs);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

`nsubs`
The number of elements in the `subs` array. Typically, you set `nsubs` equal to the number of dimensions in the `mxArray` that `array_ptr` points to.

`subs`
An array of integers. Each value in the array should specify that dimension's subscript. The value in `subs[0]` specifies the row subscript, and the value in `subs[1]` specifies the column subscript. Note that `mxCalcSingleSubscript` views 0 as the first element of an `mxArray`, but MATLAB sees 1 as the first element of an `mxArray`. For example, in MATLAB, `(1,1)` denotes the starting element of a two-dimensional `mxArray`; however, to express the starting element of a two-dimensional `mxArray` in `subs`, you must set `subs[0]` to `0` and `subs[1]` to `0`.

**Returns**

The number of elements between the start of the `mxArray` and the specified subscript. This returned number is called an "index"; many `mx` routines (for example, `mxGetField`) require an index as an argument.

If `subs` describes the starting element of an `mxArray`, `mxCalcSingleSubscript` returns 0. If `subs` describes the final element of an `mxArray`, then `mxCalcSingleSubscript` returns `N-1` (where `N` is the total number of elements).

**Description**

Call `mxCalcSingleSubscript` to determine how many elements there are between the beginning of the `mxArray` and a given element of that `mxArray`. For example, given a subscript like `(5,7)`, `mxCalcSingleSubscript` returns the distance from the `(0,0)` element of the array to the `(5,7)` element. Remember that the `mxArray` data type internally represents all data elements in a one-dimensional array no matter how many dimensions the MATLAB `mxArray` appears to have.

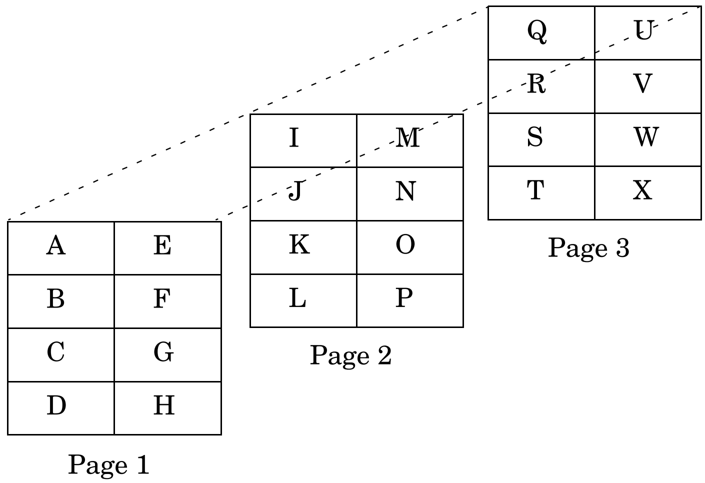
MATLAB uses a column-major numbering scheme to represent data elements internally. That means that MATLAB internally stores data elements from the first column first, then data elements from the second column second, and so on through the last column. For example, suppose you create a 4-by-2 variable. It is helpful to visualize the data as shown below.

| | |
|---|---|
| A | E |
| B | F |
| C | G |
| D | H |

Although in fact, MATLAB internally represents the data as the following:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A | B | C | D | E | F | G | H |
| Index 0 | Index 1 | Index 2 | Index 3 | Index 4 | Index 5 | Index 6 | Index 7 |

If an `mxArray` is N-dimensional, then MATLAB represents the data in N-major order. For example, consider a three-dimensional array having dimensions 4-by-2-by-3. Although you can visualize the data as




MATLAB internally represents the data for this three-dimensional array in the order shown below:

| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |

Avoid using `mxCalcSingleSubscript` to traverse the elements of an array. It is more efficient to do this by finding the array's starting address and then using pointer auto-incrementing to access successive elements. For example, to find the starting address of a numerical array, call `mxGetPr` or `mxGetPi`.

## Examples

See `mxcalcsinglesubscript.c` in the `mx` subdirectory of the `examples` directory.

**Purpose** Allocate dynamic memory for an array using MATLAB memory manager

**C Syntax**

```
#include "matrix.h"
#include <stdlib.h>
void *mxCalloc(size_t n, size_t size);
```

**Arguments**

`n`
Number of elements to allocate. This must be a nonnegative number.

`size`
Number of bytes per element. (The C `sizeof` operator calculates the number of bytes per element.)

**Returns** A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCalloc` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxCalloc` is unsuccessful when there is insufficient free heap space.

**Description** MATLAB applications should always call `mxCalloc` rather than `calloc` to allocate memory. Note that `mxCalloc` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxCalloc` automatically

- Allocates enough contiguous heap space to hold `n` elements.
- Initializes all `n` elements to 0.
- Registers the returned heap space with the MATLAB memory management facility.

The MATLAB memory management facility maintains a list of all memory allocated by `mxCalloc`. The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

In stand-alone MATLAB applications, `mxCalloc` calls the ANSI C `calloc` function.

By default, in a MEX-file, `mxCalloc` generates nonpersistent `mxCalloc` data. In other words, the memory management facility automatically deallocates the memory as soon as the MEX-file ends. If you want the memory to persist after the MEX-file completes, call mexMakeMemoryPersistent after calling mxCalloc. If you write a MEX-file with persistent memory, be sure to register a mexAtExit function to free allocated memory in the event your MEX-file is cleared.

When you finish using the memory allocated by mxCalloc, call mxFree. mxFree deallocates the memory.

## Examples

See explore.c in the mex subdirectory of the examples directory, and phonebook.c and revord.c in the refbook subdirectory of the examples directory.

For additional examples, see mxcalcsinglesubscript.c and mxsetdimensions.c in the mx subdirectory of the examples directory.

## See Also

mxFree, mxDestroyArray, mexMakeArrayPersistent, mexMakeMemoryPersistent, mxMalloc, mxRealloc

**Purpose** Data type for string `mxArray`

**C Syntax**

```
typedef Uint16 mxChar;
```

**Description** All string `mxArrays` store their data elements as `mxChar` rather than as `char`. The MATLAB API defines an `mxChar` as a 16-bit unsigned integer.

**Examples** See `mxmalloc.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `explore.c` in the `mex` subdirectory of the `examples` directory and `mxcreatecharmatrixfromstr.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxCreateCharArray`

# mxClassID

## Purpose

Integer value that identifies class of mxArray

## C Syntax

```
typedef enum {
        mxUNKNOWN_CLASS = 0,
        mxCELL_CLASS,
        mxSTRUCT_CLASS,
        mxLOGICAL_CLASS,
        mxCHAR_CLASS,
        <unused>,
        mxDOUBLE_CLASS,
        mxSINGLE_CLASS,
        mxINT8_CLASS,
        mxUINT8_CLASS,
        mxINT16_CLASS,
        mxUINT16_CLASS,
        mxINT32_CLASS,
        mxUINT32_CLASS,
        mxINT64_CLASS,
        mxUINT64_CLASS,
        mxFUNCTION_CLASS
} mxClassID;
```

## Constants

mxUNKNOWN_CLASS
The class cannot be determined. You cannot specify this category for an mxArray; however, mxGetClassID can return this value if it cannot identify the class.

mxCELL_CLASS
Identifies a cell mxArray.

mxSTRUCT_CLASS
Identifies a structure mxArray.

mxLOGICAL_CLASS
Identifies a logical mxArray; that is, an mxArray that stores Boolean elements logical 1 (true) and logical 0 (false).

mxCHAR_CLASS
Identifies a string mxArray; that is an mxArray whose data is represented as mxCHAR's.

`mxDOUBLE_CLASS`
Identifies a numeric `mxArray` whose data is stored as double-precision, floating-point numbers.

`mxSINGLE_CLASS`
Identifies a numeric `mxArray` whose data is stored as single-precision, floating-point numbers.

`mxINT8_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 8-bit integers.

`mxUINT8_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 8-bit integers.

`mxINT16_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 16-bit integers.

`mxUINT16_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 16-bit integers.

`mxINT32_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 32-bit integers.

`mxUINT32_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 32-bit integers.

`mxINT64_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 64-bit integers.

`mxUINT64_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 64-bit integers.

`mxFUNCTION_CLASS`
Identifies a function handle `mxArray`.

## Description

Various `mx` calls require or return an `mxClassID` argument. `mxClassID` identifies the way in which the `mxArray` represents its data elements.

## Examples

See `explore.c` in the `mex` subdirectory of the `examples` directory.

## See Also

`mxCreateNumericArray`

# mxClearLogical (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

This function turns off the `mxArray`'s logical flag. This flag, when cleared, tells MATLAB to treat the `mxArray`'s data as numeric data rather than as Boolean data. If the logical flag is on, then MATLAB treats a 0 value as meaning `false` and a nonzero value as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

**See Also**

`mxCreateLogicalScalar`, `mxCreateLogicalMatrix`, `mxCreateLogicalArray`, `mxCreateSparseLogicalMatrix`

**Purpose** Flag that specifies whether `mxArray` has imaginary components

**C Syntax**

```
typedef enum mxComplexity {mxREAL=0, mxCOMPLEX};
```

**Constants**

`mxREAL`
Identifies an `mxArray` with no imaginary components.

`mxCOMPLEX`
Identifies an `mxArray` with imaginary components.

**Description** Various `mx` calls require an `mxComplexity` argument. You can set an `mxComplex` argument to either `mxREAL` or `mxCOMPLEX`.

**Examples** See `mxcalcsinglesubscript.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxCreateNumericArray`, `mxCreateDoubleMatrix`, `mxCreateSparse`

# mxCreateCellArray

## Purpose

Create unpopulated N-dimensional cell `mxArray`

## C Syntax

```
#include "matrix.h"
mxArray *mxCreateCellArray(int ndim, const int *dims);
```

## Arguments

`ndim`
The desired number of dimensions in the created cell. For example, to create a three-dimensional cell `mxArray`, set `ndim` to 3.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the `mxArray` in that dimension. For example, setting `dims[0]` to 5 and `dims[1]` to 7 establishes a 5-by-7 `mxArray`. In most cases, there should be `ndim` elements in the `dims` array.

## Returns

A pointer to the created cell `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateCellArray` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. The most common cause of failure is insufficient free heap space.

## Description

Use `mxCreateCellArray` to create a cell `mxArray` whose size is defined by `ndim` and `dims`. For example, to establish a three-dimensional cell `mxArray` having dimensions 4-by-8-by-7, set

```
ndim = 3;
dims[0] = 4; dims[1] = 8; dims[2] = 7;
```

The created cell `mxArray` is unpopulated; that is, `mxCreateCellArray` initializes each cell to `NULL`. To put data into a cell, call `mxSetCell`.

Any trailing singleton dimensions specified in the `dims` argument are automatically removed from the resulting array. For example, if `ndim` equals `5` and `dims` equals `[4 1 7 1 1]`, the resulting array is given the dimensions 4-by-1-by-7.

## Examples

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

## See Also

`mxCreateCellMatrix`, `mxGetCell`, `mxSetCell`, `mxIsCell`

**Purpose** Create unpopulated two-dimensional cell mxArray

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateCellMatrix(int m, int n);
```

**Arguments**

m
The desired number of rows.

n
The desired number of columns.

**Returns** A pointer to the created cell mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCellMatrix returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for mxCreateCellMatrix to be unsuccessful.

**Description** Use mxCreateCellMatrix to create an m-by-n two-dimensional cell mxArray. The created cell mxArray is unpopulated; that is, mxCreateCellMatrix initializes each cell to NULL. To put data into cells, call mxSetCell.

mxCreateCellMatrix is identical to mxCreateCellArray except that mxCreateCellMatrix can create two-dimensional mxArrays only, but mxCreateCellArray can create mxArrays having any number of dimensions greater than 1.

**Examples** See mxcreatecellmatrix.c in the mx subdirectory of the examples directory.

**See Also** mxCreateCellArray

# mxCreateCharArray

**Purpose** Create unpopulated N-dimensional string mxArray

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateCharArray(int ndim, const int *dims);
```

**Arguments**

ndim
The desired number of dimensions in the string mxArray. You must specify a positive number. If you specify 0, 1, or 2, mxCreateCharArray creates a two-dimensional mxArray.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. The dims array must have at least ndim elements.

**Returns** A pointer to the created string mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCharArray returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for mxCreateCharArray to be unsuccessful.

**Description** Call mxCreateCharArray to create an unpopulated N-dimensional string mxArray.

Any trailing singleton dimensions specified in the dims argument are automatically removed from the resulting array. For example, if ndim equals 5 and dims equals [4 1 7 1 1], the resulting array is given the dimensions 4-by-1-by-7.

**Examples** See mxcreatecharmatrixfromstr.c in the mx subdirectory of the examples directory.

**See Also** mxCreateCharMatrixFromStrings, mxCreateString

**Purpose**

Create populated two-dimensional string mxArray

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateCharMatrixFromStrings(int m, const char **str);
```

**Arguments**

m
The desired number of rows in the created string mxArray. The value you specify for m should equal the number of strings in str.

str
A pointer to a list of strings. The str array must contain at least m strings.

**Returns**

A pointer to the created string mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCharMatrixFromStrings returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the primary reason for mxCreateCharArray to be unsuccessful. Another possible reason for failure is that str contains fewer than m strings.

**Description**

Use mxCreateCharMatrixFromStrings to create a two-dimensional string mxArray, where each row is initialized to a string from str. The created mxArray has dimensions m-by-max, where max is the length of the longest string in str.

Note that string mxArrays represent their data elements as mxChar rather than as char.

**Examples**

See mxcreatecharmatrixfromstr.c in the mx subdirectory of the examples directory.

**See Also**

mxCreateCharArray, mxCreateString, mxGetString

# mxCreateDoubleMatrix

**Purpose**

Create unpopulated two-dimensional, double-precision, floating-point `mxArray`

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateDoubleMatrix(int m, int n,
  mxComplexity ComplexFlag);
```

**Arguments**

`m`
The desired number of rows.

`n`
The desired number of columns.

`ComplexFlag`
Specify either `mxREAL` or `mxCOMPLEX`. If the data you plan to put into the `mxArray` has no imaginary components, specify `mxREAL`. If the data has some imaginary components, specify `mxCOMPLEX`.

**Returns**

A pointer to the created `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateDoubleMatrix` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. `mxCreateDoubleMatrix` is unsuccessful when there is not enough free heap space to create the `mxArray`.

**Description**

Use `mxCreateDoubleMatrix` to create an `m`-by-`n` `mxArray`. `mxCreateDoubleMatrix` initializes each element in the `pr` array to 0. If you set `ComplexFlag` to `mxCOMPLEX`, `mxCreateDoubleMatrix` also initializes each element in the `pi` array to 0.

If you set `ComplexFlag` to `mxREAL`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements. If you set `ComplexFlag` to `mxCOMPLEX`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements and `m`-by-`n` imaginary elements.

Call `mxDestroyArray` when you finish using the `mxArray`. `mxDestroyArray` deallocates the `mxArray` and its associated real and complex elements.

**Examples**

See `convec.c`, `findnz.c`, `sincall.c`, `timestwo.c`, `timestwoalt.c`, and `xtimesy.c` in the `refbook` subdirectory of the `examples` directory.

**See Also**

`mxCreateNumericArray`, `mxComplexity`

**Purpose**

Create scalar, double-precision array initialized to specified value

---

**Note** This function replaces `mxCreateScalarDouble` in version 6.5 of MATLAB. `mxCreateScalarDouble` is still supported in version 6.5, but may be removed in a future version.

---

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateDoubleScalar(double value);
```

**Arguments**

`value`
The desired value to which you want to initialize the array.

**Returns**

A pointer to the created `mxArray`, if successful. `mxCreateDoubleScalar` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateDoubleScalar` is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If `mxCreateDoubleScalar` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateDoubleScalar` returns `NULL`.

**Description**

Call `mxCreateDoubleScalar` to create a scalar double `mxArray`. `mxCreateDoubleScalar` is a convenience function that can be used in place of the following code:

```
pa = mxCreateDoubleMatrix(1, 1, mxREAL);
*mxGetPr(pa) = value;
```

When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

**See Also**

`mxGetPr`, `mxCreateDoubleMatrix`

# mxCreateFull (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
mxCreateDoubleMatrix
```

instead of

```
mxCreateFull
```

**See Also** `mxCreateDoubleMatrix`

**Purpose**

Create N-dimensional logical `mxArray` initialized to `false`

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateLogicalArray(int ndim, const int *dims);
```

**Arguments**

`ndim`
Number of dimensions. If you specify a value for `ndim` that is less than 2, `mxCreateLogicalArray` automatically sets the number of dimensions to 2.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims[0]` to `5` and `dims[1]` to `7` establishes a 5-by-7 `mxArray`. There should be `ndim` elements in the `dims` array.

**Returns**

A pointer to the created `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateLogicalArray` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. `mxCreateLogicalArray` is unsuccessful when there is not enough free heap space to create the `mxArray`.

**Description**

Call `mxCreateLogicalArray` to create an N-dimensional `mxArray` of logical `1` (`true`) and logical `0` (`false`) elements. After creating the `mxArray`, `mxCreateLogicalArray` initializes all its elements to logical 0. `mxCreateLogicalArray` differs from `mxCreateLogicalMatrix` in that the latter can create two-dimensional arrays only.

`mxCreateLogicalArray` allocates dynamic memory to store the created `mxArray`. When you finish with the created `mxArray`, call `mxDestroyArray` to deallocate its memory.

Any trailing singleton dimensions specified in the `dims` argument are automatically removed from the resulting array. For example, if `ndim` equals `5` and `dims` equals `[4 1 7 1 1]`, the resulting array is given the dimensions 4-by-1-by-7.

**See Also**

`mxCreateLogicalMatrix`, `mxCreateSparseLogicalMatrix`, `mxCreateLogicalScalar`

# mxCreateLogicalMatrix

## Purpose

Create two-dimensional, logical mxArray initialized to false

## C Syntax

```
#include "matrix.h"
mxArray *mxCreateLogicalMatrix(int m, int n);
```

## Arguments

m
The desired number of rows.

n
The desired number of columns.

## Returns

A pointer to the created mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateLogicalMatrix returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. mxCreateLogicalMatrix is unsuccessful when there is not enough free heap space to create the mxArray.

## Description

Use mxCreateLogicalMatrix to create an m-by-n mxArray of logical 1 (true) and logical 0 (false) elements. mxCreateLogicalMatrix initializes each element in the array to logical 0.

Call mxDestroyArray when you finish using the mxArray. mxDestroyArray deallocates the mxArray.

## See Also

mxCreateLogicalArray, mxCreateSparseLogicalMatrix, mxCreateLogicalScalar

**Purpose** Create scalar, logical `mxArray` initialized to `false`

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateLogicalScalar(mxLogical value);
```

**Arguments**

`value`
The desired logical value, logical `1` (`true`) or logical `0` (`false`), to which you want to initialize the array.

**Returns** A pointer to the created `mxArray`, if successful. `mxCreateLogicalScalar` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateLogicalScalar` is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If `mxCreateLogicalScalar` is unsuccessful in a stand-alone (nonMEX-file) application, the function returns `NULL`.

**Description** Call `mxCreateLogicalScalar` to create a scalar logical `mxArray`. `mxCreateLogicalScalar` is a convenience function that can be used in place of the following code:

```
pa = mxCreateLogicalMatrix(1, 1);
*mxGetLogicals(pa) = value;
```

When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

**See Also** `mxIsLogicalScalar`, `mxIsLogicalScalarTrue`, `mxCreateLogicalMatrix`, `mxCreateLogicalArray`, `mxGetLogicals`

# mxCreateNumericArray

**Purpose**

Create unpopulated N-dimensional numeric mxArray

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateNumericArray(int ndim, const int *dims,
          mxClassID class, mxComplexity ComplexFlag);
```

**Arguments**

ndim
Number of dimensions. If you specify a value for ndim that is less than 2, mxCreateNumericArray automatically sets the number of dimensions to 2.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. In most cases, there should be ndim elements in the dims array.

class
The way in which the numerical data is to be represented in memory. For example, specifying mxINT16_CLASS causes each piece of numerical data in the mxArray to be represented as a 16-bit signed integer. You can specify any class except for mxNUMERIC_CLASS, mxSTRUCT_CLASS, or mxCELL_CLASS.

ComplexFlag
Specify either mxREAL or mxCOMPLEX. If the data you plan to put into the mxArray has no imaginary components, specify mxREAL. If the data will have some imaginary components, specify mxCOMPLEX.

**Returns**

A pointer to the created mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateNumericArray returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. mxCreateNumericArray is unsuccessful when there is not enough free heap space to create the mxArray.

**Description**

Call mxCreateNumericArray to create an N-dimensional mxArray in which all data elements have the numeric data type specified by class. After creating the mxArray, mxCreateNumericArray initializes all its real data elements to 0. If ComplexFlag equals mxCOMPLEX, mxCreateNumericArray also initializes all its imaginary data elements to 0. mxCreateNumericArray differs from mxCreateDoubleMatrix in two important respects:

- All data elements in mxCreateDoubleMatrix are double-precision, floating-point numbers. The data elements in mxCreateNumericArray could be any numerical type, including different integer precisions.
- mxCreateDoubleMatrix can create two-dimensional arrays only; mxCreateNumericArray can create arrays of two or more dimensions.

mxCreateNumericArray allocates dynamic memory to store the created mxArray. When you finish with the created mxArray, call mxDestroyArray to deallocate its memory.

Any trailing singleton dimensions specified in the dims argument are automatically removed from the resulting array. For example, if ndim equals 5 and dims equals [4 1 7 1 1], the resulting array is given the dimensions 4-by-1-by-7.

## Examples

See phonebook.c and doubleelement.c in the refbook subdirectory of the examples directory. For an additional example, see mxisfinite.c in the mx subdirectory of the examples directory.

## See Also

mxClassID, mxCreateDoubleMatrix, mxCreateSparse, mxCreateString, mxComplexity

# mxCreateNumericMatrix

## Purpose

Create numeric matrix and initialize data elements to 0

## C Syntax

```
#include "matrix.h"
mxArray *mxCreateNumericMatrix(int m, int n, mxClassID class,
  mxComplexity ComplexFlag);
```

## Arguments

`m`
The desired number of rows.

`n`
The desired number of columns.

`class`
The way in which the numerical data is to be represented in memory. For example, specifying `mxINT16_CLASS` causes each piece of numerical data in the `mxArray` to be represented as a 16-bit signed integer. You can specify any numeric class including `mxDOUBLE_CLASS`, `mxSINGLE_CLASS`, `mxINT8_CLASS`, `mxUINT8_CLASS`, `mxINT16_CLASS`, `mxUINT16_CLASS`, `mxINT32_CLASS`, `mxUINT32_CLASS`, `mxINT64_CLASS`, and `mxUINT64_CLASS`.

`ComplexFlag`
Specify either `mxREAL` or `mxCOMPLEX`. If the data you plan to put into the `mxArray` has no imaginary components, specify `mxREAL`. If the data has some imaginary components, specify `mxCOMPLEX`.

## Returns

A pointer to the created `mxArray`, if successful. `mxCreateNumericMatrix` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateNumericMatrix` is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If `mxCreateNumericMatrix` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateNumericMatrix` returns `NULL`.

## Description

Call `mxCreateNumericMatrix` to create an 2-dimensional `mxArray` in which all data elements have the numeric data type specified by `class`. After creating the `mxArray`, `mxCreateNumericMatrix` initializes all its real data elements to 0. If `ComplexFlag` equals `mxCOMPLEX`, `mxCreateNumericMatrix` also initializes all its imaginary data elements to 0. `mxCreateNumericMatrix` allocates dynamic memory to store the created `mxArray`. When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

**See Also** `mxCreateNumericArray`

# mxCreateScalarDouble

**Purpose**

Create scalar, double-precision array initialized to specified value

---

**Note** This function is replaced by `mxCreateDoubleScalar` in version 6.5 of MATLAB. `mxCreateScalarDouble` is still supported in version 6.5, but may be removed in a future version.

---

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateScalarDouble(double value);
```

**Arguments**

`value`
The desired value to which you want to initialize the array.

**Returns**

A pointer to the created `mxArray`, if successful. `mxCreateScalarDouble` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateScalarDouble` is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If `mxCreateScalarDouble` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateScalarDouble` returns `NULL`.

**Description**

Call `mxCreateScalarDouble` to create a scalar double `mxArray`. `mxCreateScalarDouble` is a convenience function that can be used in place of the following code:

```
pa = mxCreateDoubleMatrix(1, 1, mxREAL);
*mxGetPr(pa) = value;
```

When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

**See Also**

`mxGetPr`, `mxCreateDoubleMatrix`

## Purpose

Create two-dimensional unpopulated sparse mxArray

## C Syntax

```
#include "matrix.h"
mxArray *mxCreateSparse(int m, int n, int nzmax,
         mxComplexity ComplexFlag);
```

## Arguments

m
The desired number of rows.

n
The desired number of columns.

nzmax
The number of elements that mxCreateSparse should allocate to hold the pr, ir, and, if ComplexFlag is mxCOMPLEX, pi arrays. Set the value of nzmax to be greater than or equal to the number of nonzero elements you plan to put into the mxArray, but make sure that nzmax is less than or equal to m*n.

ComplexFlag
Set this value to mxREAL or mxCOMPLEX. If the mxArray you are creating is to contain imaginary data, then set ComplexFlag to mxCOMPLEX. Otherwise, set ComplexFlag to mxREAL.

## Returns

A pointer to the created sparse double mxArray if successful, and NULL otherwise. The most likely reason for failure is insufficient free heap space. If that happens, try reducing nzmax, m, or n.

## Description

Call mxCreateSparse to create an unpopulated sparse double mxArray. The returned sparse mxArray contains no sparse information and cannot be passed as an argument to any MATLAB sparse functions. In order to make the returned sparse mxArray useful, you must initialize the pr, ir, jc, and (if it exists) pi array.

mxCreateSparse allocates space for:

- A pr array of length nzmax.
- A pi array of length nzmax (but only if ComplexFlag is mxCOMPLEX).
- An ir array of length nzmax.
- A jc array of length n+1.

When you finish using the sparse `mxArray`, call `mxDestroyArray` to reclaim all its heap space.

## Examples

See `fulltosparse.c` in the `refbook` subdirectory of the `examples` directory.

## See Also

`mxDestroyArray`, `mxSetNzmax`, `mxSetPr`, `mxSetPi`, `mxSetIr`, `mxSetJc`, `mxComplexity`

# mxCreateSparseLogicalMatrix

**Purpose**

Create unpopulated two-dimensional, sparse, logical mxArray

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateSparseLogicalMatrix(int m, int n, int nzmax);
```

**Arguments**

m
The desired number of rows.

n
The desired number of columns.

nzmax
The number of elements that mxCreateSparseLogicalMatrix should allocate to hold the data. Set the value of nzmax to be greater than or equal to the number of nonzero elements you plan to put into the mxArray, but make sure that nzmax is less than or equal to m*n.

**Returns**

A pointer to the created mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateSparseLogicalMatrix returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. mxCreateSparseLogicalMatrix is unsuccessful when there is not enough free heap space to create the mxArray.

**Description**

Use mxCreateSparseLogicalMatrix to create an m-by-n mxArray of logical 1 (true) and logical 0 (false) elements. mxCreateSparseLogicalMatrix initializes each element in the array to logical 0.

Call mxDestroyArray when you finish using the mxArray. mxDestroyArray deallocates the mxArray and its elements.

**See Also**

mxCreateLogicalMatrix, mxCreateLogicalArray, mxCreateLogicalScalar, mxCreateSparse, mxIsLogical

# mxCreateString

**Purpose**

Create 1-by-N string mxArray initialized to specified string

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateString(const char *str);
```

**Arguments**

str
The C string that is to serve as the mxArray's initial data.

**Returns**

A pointer to the created string mxArray if successful, and NULL otherwise. The most likely cause of failure is insufficient free heap space.

**Description**

Use mxCreateString to create a string mxArray initialized to str. Many MATLAB functions (for example, strcmp and upper) require string array inputs.

Free the string mxArray when you are finished using it. To free a string mxArray, call mxDestroyArray.

**Examples**

See revord.c in the refbook subdirectory of the examples directory.

For additional examples, see mxcreatestructarray.c and mxisclass.c in the mx subdirectory of the examples directory.

**See Also**

mxCreateCharMatrixFromStrings, mxCreateCharArray

**Purpose**

Create unpopulated N-dimensional structure mxArray

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateStructArray(int ndim, const int *dims, int nfields,
         const char **field_names);
```

**Arguments**

ndim
Number of dimensions. If you set ndim to be less than 2, mxCreateNumericArray creates a two-dimensional mxArray.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. Typically, the dims array should have ndim elements.

nfields
The desired number of fields in each element.

field_names
The desired list of field names.

Structure field names must begin with a letter, and are case-sensitive. The rest of the name may contain letters, numerals, and underscore characters. Use the namelengthmax function to determine the maximum length of a field name.

**Returns**

A pointer to the created structure mxArray if successful, and NULL otherwise. The most likely cause of failure is insufficient heap space to hold the returned mxArray.

**Description**

Call mxCreateStructArray to create an unpopulated structure mxArray. Each element of a structure mxArray contains the same number of fields (specified in nfields). Each field has a name; the list of names is specified in field_names. A structure mxArray in MATLAB is conceptually identical to an array of structs in the C language.

Each field holds one mxArray pointer. mxCreateStructArray initializes each field to NULL. Call mxSetField or mxSetFieldByNumber to place a non-NULL mxArray pointer in a field.

When you finish using the returned structure `mxArray`, call `mxDestroyArray` to reclaim its space.

Any trailing singleton dimensions specified in the `dims` argument are automatically removed from the resulting array. For example, if `ndim` equals `5` and `dims` equals `[4 1 7 1 1]`, the resulting array is given the dimensions 4-by-1-by-7.

## Examples

See `mxcreatestructarray.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxDestroyArray`, `mxSetNzmax`, `namelengthmax`

**Purpose**

Create unpopulated two-dimensional structure mxArray

**C Syntax**

```
#include "matrix.h"
mxArray *mxCreateStructMatrix(int m, int n, int nfields,
         const char **field_names);
```

**Arguments**

m
The desired number of rows. This must be a positive integer.

n
The desired number of columns. This must be a positive integer.

nfields
The desired number of fields in each element.

field_names
The desired list of field names.

Structure field names must begin with a letter, and are case-sensitive. The rest of the name may contain letters, numerals, and underscore characters. Use the namelengthmax function to determine the maximum length of a field name.

**Returns**

A pointer to the created structure mxArray if successful, and NULL otherwise. The most likely cause of failure is insufficient heap space to hold the returned mxArray.

**Description**

mxCreateStructMatrix and mxCreateStructArray are almost identical. The only difference is that mxCreateStructMatrix can only create two-dimensional mxArrays, while mxCreateStructArray can create mxArrays having two or more dimensions.

**Examples**

See phonebook.c in the refbook subdirectory of the examples directory.

**See Also**

mxCreateStructArray, mxGetFieldByNumber, mxGetFieldNameByNumber, mxGetFieldNumber, mxIsStruct, namelengthmax

# mxDestroyArray

**Purpose**

Free dynamic memory allocated by `mxCreate`

**C Syntax**

```
#include "matrix.h"
void mxDestroyArray(mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to the `mxArray` that you want to free.

**Description**

`mxDestroyArray` deallocates the memory occupied by the specified `mxArray`. `mxDestroyArray` not only deallocates the memory occupied by the `mxArray's` characteristics fields (such as `m` and `n`), but also deallocates all the `mxArray's` associated data arrays (such as `pr`, `pi`, `ir`, and/or `jc`). You should not call `mxDestroyArray` on an `mxArray` you are returning on the left-hand side.

**Examples**

See `sincall.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mexcallmatlab.c` and `mexgetarray.c` in the `mex` subdirectory of the `examples` directory; see `mxisclass.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxCalloc`, `mxFree`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

**Purpose** Make deep copy of array

**C Syntax**

```
#include "matrix.h"
mxArray *mxDuplicateArray(const mxArray *in);
```

**Arguments**

`in`
Pointer to the `mxArray` that you want to copy.

**Returns** Pointer to a copy of the array.

**Description**

`mxDuplicateArray` makes a deep copy of an array, and returns a pointer to the copy. A deep copy refers to a copy in which all levels of data are copied. For example, a deep copy of a cell array copies each cell, and the contents of the each cell (if any), and so on.

**Examples**

See `mexget.c` in the `mex` subdirectory of the `examples` directory and `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxcreatecellmatrix.c`, `mxgetinf.c`, and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

# mxFree

## Purpose

Free dynamic memory allocated by `mxCalloc`, `mxMalloc`, or `mxRealloc`

## C Syntax

```
#include "matrix.h"
void mxFree(void *ptr);
```

## Arguments

`ptr`
Pointer to the beginning of any memory parcel allocated by `mxCalloc`, `mxMalloc`, or `mxRealloc`.

## Description

To deallocate heap space, MATLAB applications should always call `mxFree` rather than the ANSI C `free` function.

`mxFree` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxFree` automatically

- Calls the ANSI C `free` function, which deallocates the contiguous heap space that begins at address `ptr`.
- Removes this memory parcel from the MATLAB memory management facility's list of memory parcels.

The MATLAB memory management facility maintains a list of all memory allocated by `mxCalloc` (and by the `mxCreate` calls). The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

When `mxFree` appears in stand-alone MATLAB applications, `mxFree` simply calls the ANSI C `free` function.

In a MEX-file, your use of `mxFree` depends on whether the specified memory parcel is persistent or nonpersistent. By default, memory parcels created by `mxCalloc` are nonpersistent. However, if an application calls `mexMakeMemoryPersistent`, then the specified memory parcel becomes persistent.

The MATLAB memory management facility automatically frees all nonpersistent memory whenever a MEX-file completes. Thus, even if you do not call `mxFree`, MATLAB takes care of freeing the memory for you. Nevertheless, it is a good programming practice to deallocate memory just as soon as you are through using it. Doing so generally makes the entire system run more efficiently.

When a MEX-file completes, the MATLAB memory management facility does not free persistent memory parcels. Therefore, the only way to free a persistent memory parcel is to call `mxFree`. Typically, MEX-files call `mexAtExit` to register a clean-up handler. Then, the clean-up handler calls `mxFree`.

## Examples

See `mxcalcsinglesubscript.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `phonebook.c` in the `refbook` subdirectory of the `examples` directory; see `explore.c` and `mexatexit.c` in the `mex` subdirectory of the `examples` directory; see `mxcreatecharmatrixfromstr.c`, `mxisfinite.c`, `mxmalloc.c`, and `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxCalloc`, `mxDestroyArray`, `mxMalloc`, `mxRealloc`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

# mxFreeMatrix (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
mxDestroyArray
```

instead of

```
mxFreeMatrix
```

**See Also** `mxDestroyArray`

**Purpose**

Get contents of mxArray cell

**C Syntax**

```
#include "matrix.h"
mxArray *mxGetCell(const mxArray *array_ptr, int index);
```

**Arguments**

array_ptr
Pointer to a cell mxArray.

index
The number of elements in the cell mxArray between the first element and the desired one. See mxCalcSingleSubscript for details on calculating an index in a multidimensional cell array.

**Returns**

A pointer to the ith cell mxArray if successful, and NULL otherwise. Causes of failure include:

- The indexed cell array element has not been populated.
- Specifying an array_ptr that does not point to a cell mxArray.
- Specifying an index greater than the number of elements in the cell.
- Insufficient free heap space to hold the returned cell mxArray.

**Description**

Call mxGetCell to get a pointer to the mxArray held in the indexed element of the cell mxArray.

---

**Note** Inputs to a MEX-file are constant read-only mxArrays and should not be modified. Using mxSetCell* or mxSetField* to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

**Examples**

See explore.c in the mex subdirectory of the examples directory.

**See Also**

mxCreateCellArray, mxIsCell, mxSetCell

**Purpose**

Get pointer to character array data

**C Syntax**

```
#include "matrix.h"
mxCHAR *mxGetChars(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

The address of the first character in the `mxArray`. Returns `NULL` if the specified array is not a character array.

**Description**

Call `mxGetChars` to determine the address of the first character in the `mxArray` that `array_ptr` points to. Once you have the starting address, you can access any other element in the `mxArray`.

**See Also**

`mxGetString`, `mxGetPr`, `mxGetPi`, `mxGetCell`, `mxGetField`, `mxGetLogicals`, `mxGetScalar`

## Purpose

Get class of mxArray

## C Syntax

```
#include "matrix.h"
mxClassID mxGetClassID(const mxArray *array_ptr);
```

## Arguments

array_ptr
Pointer to an mxArray.

## Returns

The class (category) of the mxArray that array_ptr points to. Classes are:

mxUNKNOWN_CLASS
The class cannot be determined. You cannot specify this category for an mxArray; however, mxGetClassID can return this value if it cannot identify the class.

mxCELL_CLASS
Identifies a cell mxArray.

mxSTRUCT_CLASS
Identifies a structure mxArray.

mxCHAR_CLASS
Identifies a string mxArray; that is an mxArray whose data is represented as mxCHAR's.

mxLOGICAL_CLASS
Identifies a logical mxArray; that is, an mxArray that stores the logical values 1 and 0, representing the states true and false respectively.

mxDOUBLE_CLASS
Identifies a numeric mxArray whose data is stored as double-precision, floating-point numbers.

mxSINGLE_CLASS
Identifies a numeric mxArray whose data is stored as single-precision, floating-point numbers.

mxINT8_CLASS
Identifies a numeric mxArray whose data is stored as signed 8-bit integers.

mxUINT8_CLASS
Identifies a numeric mxArray whose data is stored as unsigned 8-bit integers.

mxINT16_CLASS
Identifies a numeric mxArray whose data is stored as signed 16-bit integers.

mxUINT16_CLASS
Identifies a numeric mxArray whose data is stored as unsigned 16-bit integers.

mxINT32_CLASS
Identifies a numeric mxArray whose data is stored as signed 32-bit integers.

mxUINT32_CLASS
Identifies a numeric mxArray whose data is stored as unsigned 32-bit integers.

mxINT64_CLASS
Identifies a numeric mxArray whose data is stored as signed 64-bit integers.

mxUINT64_CLASS
Identifies a numeric mxArray whose data is stored as unsigned 64-bit integers.

mxFUNCTION_CLASS
Identifies a function handle mxArray.

## Description

Use mxGetClassId to determine the class of an mxArray. The class of an mxArray identifies the kind of data the mxArray is holding. For example, if array_ptr points to a logical mxArray, then mxGetClassID returns mxLOGICAL_CLASS.

mxGetClassID is similar to mxGetClassName, except that the former returns the class as an integer identifier and the latter returns the class as a string.

## Examples

See phonebook.c in the refbook subdirectory of the examples directory and explore.c in the mex subdirectory of the examples directory.

## See Also

mxGetClassName

**Purpose**

Get class of mxArray as string

**C Syntax**

```
#include "matrix.h"
const char *mxGetClassName(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

The class (as a string) of array_ptr.

**Description**

Call mxGetClassName to determine the class of an mxArray. The class of an mxArray identifies the kind of data the mxArray is holding. For example, if array_ptr points to a logical mxArray, then mxGetClassName returns logical.

mxGetClassID is similar to mxGetClassName, except that the former returns the class as an integer identifier and the latter returns the class as a string.

**Examples**

See mexfunction.c in the mex subdirectory of the examples directory. For an additional example, see mxisclass.c in the mx subdirectory of the examples directory.

**See Also**

mxGetClassID

# mxGetData

**Purpose**

Get pointer to data

**C Syntax**

```
#include "matrix.h"
void *mxGetData(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Description**

Similar to `mxGetPr`, except `mxGetData` returns a `void *`.

**Examples**

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxcreatecharmatrixfromstr.c` and `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxGetImagData`, `mxGetPr`

**Purpose**

Get pointer to dimensions array

**C Syntax**

```
#include "matrix.h"
const int *mxGetDimensions(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

The address of the first element in a dimension array. Each integer in the dimensions array represents the number of elements in a particular dimension. The array is not `NULL`-terminated.

**Description**

Use `mxGetDimensions` to determine how many elements are in each dimension of the `mxArray` that `array_ptr` points to. Call `mxGetNumberOfDimensions` to get the number of dimensions in the `mxArray`.

**Examples**

See `mxcalcsinglesubscript.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `findnz.c` and `phonebook.c` in the `refbook` subdirectory of the `examples` directory; see `explore.c` in the `mex` subdirectory of the `examples` directory; see `mxgeteps.c` and `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxGetNumberOfDimensions`

# mxGetElementSize

**Purpose**

Get number of bytes required to store each data element

**C Syntax**

```
#include "matrix.h"
int mxGetElementSize(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

The number of bytes required to store one element of the specified `mxArray`, if successful. Returns 0 on failure. The primary reason for failure is that `array_ptr` points to an `mxArray` having an unrecognized class. If `array_ptr` points to a cell `mxArray` or a structure `mxArray`, then `mxGetElementSize` returns the size of a pointer (not the size of all the elements in each cell or structure field).

**Description**

Call `mxGetElementSize` to determine the number of bytes in each data element of the `mxArray`. For example, if the `mxClassID` of an `mxArray` is `mxINT16_CLASS`, then the `mxArray` stores each data element as a 16-bit (2 byte) signed integer. Thus, `mxGetElementSize` returns 2.

`mxGetElementSize` is particularly helpful when using a non-MATLAB routine to manipulate data elements. For example, `memcpy` requires (for its third argument) the size of the elements you intend to copy.

**Examples**

See `doubleelement.c` and `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

**See Also**

`mxGetM`, `mxGetN`

**Purpose** Get value of `eps`

**C Syntax**

```
#include "matrix.h"
double mxGetEps(void);
```

**Returns** The value of the MATLAB `eps` variable.

**Description** Call `mxGetEps` to return the value of the MATLAB `eps` variable. This variable holds the distance from 1.0 to the next largest floating-point number. As such, it is a measure of floating-point accuracy. The MATLAB `PINV` and `RANK` functions use `eps` as a default tolerance.

**Examples** See `mxgeteps.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxGetInf`, `mxGetNaN`

# mxGetField

**Purpose** Get field value, given field name and index into structure array

**C Syntax**

```
#include "matrix.h"
mxArray *mxGetField(const mxArray *array_ptr, int index,
         const char *field_name);
```

**Arguments**

`array_ptr`
Pointer to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an `index` of `0`, the second element has an `index` of `1`, and the last element has an `index` of `N-1`, where `N` is the total number of elements in the structure `mxArray`.

`field_name`
The name of the field whose value you want to extract.

**Returns**

A pointer to the `mxArray` in the specified field at the specified `field_name`, on success. Returns `NULL` if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. To determine if `array_ptr` points to a structure `mxArray`, call `mxIsStruct`.
- Specifying an out-of-range `index` to an element past the end of the `mxArray`. For example, given a structure `mxArray` that contains 10 elements, you cannot specify an `index` greater than 9.
- Specifying a nonexistent `field_name`. Call `mxGetFieldNameByNumber` or `mxGetFieldNumber` to get existing `field names`.
- Insufficient heap space to hold the returned `mxArray`.

**Description**

Call `mxGetField` to get the value held in the specified element of the specified field. In pseudo-C terminology, `mxGetField` returns the value at

```
array_ptr[index].field_name
```

`mxGetFieldByNumber` is similar to `mxGetField`. Both functions return the same value. The only difference is in the way you specify the field. `mxGetFieldByNumber` takes `field_num` as its third argument, and `mxGetField` takes `field_name` as its third argument.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxGetField(pa, index, "field_name");
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxGetFieldByNumber(pa, index, field_num);
```

where `index` is zero if you have a one-by-one structure.

## See Also

`mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`, `mxSetFieldByNumber`

# mxGetFieldByNumber

## Purpose

Get field value, given field number and index into structure array

## C Syntax

```
#include "matrix.h"
mxArray *mxGetFieldByNumber(const mxArray *array_ptr, int index,
         int field_number);
```

## Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an `index` of `0`, the second element has an `index` of `1`, and the last element has an `index` of `N-1`, where `N` is the total number of elements in the structure `mxArray`. See `mxCalcSingleSubscript` for more details on calculating an `index`.

`field_number`
The position of the field whose value you want to extract. The first field within each element has a field number of `0`, the second field has a field number of `1`, and so on. The last field has a field number of `N-1`, where `N` is the number of fields.

## Returns

A pointer to the `mxArray` in the specified field for the desired element, on success. Returns `NULL` if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to is a structure `mxArray`.
- Specifying an index < 0 or >= the number of elements in the array.
- Specifying a nonexistent field number. Call `mxGetFieldNumber` to determine the field number that corresponds to a given field name.

## Description

Call `mxGetFieldByNumber` to get the value held in the specified `field_number` at the indexed element.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxGetField(pa, index, "field_name");
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxGetFieldByNumber(pa, index, field_num);
```

where `index` is zero if you have a one-by-one structure.

## Examples

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxisclass.c` in the `mx` subdirectory of the `examples` directory and `explore.c` in the `mex` subdirectory of the `examples` directory.

## See Also

`mxGetField`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

# mxGetFieldNameByNumber

**Purpose** Get field name, given field number in structure array

**C Syntax**

```
#include "matrix.h"
const char *mxGetFieldNameByNumber(const mxArray *array_ptr,
            int field_number);
```

**Arguments**

`array_ptr`
Pointer to a structure `mxArray`.

`field_number`
The position of the desired field. For instance, to get the name of the first field, set `field_number` to 0; to get the name of the second field, set `field_number` to 1; and so on.

**Returns** A pointer to the nth field name, on success. Returns `NULL` on failure. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.
- Specifying a value of `field_number` greater than or equal to the number of fields in the structure `mxArray`. (Remember that `field_number` 0 symbolizes the first field, so `index N-1` symbolizes the last field.)

**Description** Call `mxGetFieldNameByNumber` to get the name of a field in the given structure `mxArray`. A typical use of `mxGetFieldNameByNumber` is to call it inside a loop in order to get the names of all the fields in a given `mxArray`.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number 0 represents the field `name`; field number 1 represents field `billing`; field number 2 represents field `test`. A field number other than 0, 1, or 2 causes `mxGetFieldNameByNumber` to return `NULL`.

**Examples** See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxisclass.c` in the `mx` subdirectory of the `examples` directory and `explore.c` in the `mex` subdirectory of the `examples` directory.

**See Also**

`mxGetField`, `mxIsStruct`, `mxSetField`

# mxGetFieldNumber

## Purpose

Get field number, given field name in structure array

## C Syntax

```
#include "matrix.h"
int mxGetFieldNumber(const mxArray *array_ptr,
    const char *field_name);
```

## Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`field_name`
The name of a field in the structure `mxArray`.

## Returns

The field number of the specified `field_name`, on success. The first field has a field number of 0, the second field has a field number of 1, and so on. Returns `-1` on failure. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.
- Specifying the `field_name` of a nonexistent field.

## Description

If you know the name of a field but do not know its field number, call `mxGetFieldNumber`. Conversely, if you know the field number but do not know its field name, call `mxGetFieldNameByNumber`.

For example, consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field `name` has a field number of 0; the field `billing` has a field number of 1; and the field `test` has a field number of 2. If you call `mxGetFieldNumber` and specify a field name of anything other than `name`, `billing`, or `test`, then `mxGetFieldNumber` returns `-1`.

Calling

```
mxGetField(pa, index, "field_name");
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxGetFieldByNumber(pa, index, field_num);
```

where `index` is zero if you have a one-by-one structure.

## Examples

See `mxcreatestructarray.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

# mxGetImagData

**Purpose** Get pointer to imaginary data of `mxArray`

**C Syntax**

```
#include "matrix.h"
void *mxGetImagData(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Description** Similar to `mxGetPi`, except it returns a `void *`.

**Examples** See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxGetData`, `mxGetPi`

**Purpose** Get value of infinity

**C Syntax**

```
#include "matrix.h"
double mxGetInf(void);
```

**Returns** The value of infinity on your system.

**Description** Call `mxGetInf` to return the value of the MATLAB internal `inf` variable. `inf` is a permanent variable representing IEEE arithmetic positive infinity. The value of `inf` is built into the system; you cannot modify it.

Operations that return infinity include:

- Division by 0. For example, 5/0 returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

**Examples** See `mxgetinf.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxGetEps`, `mxGetNaN`

# mxGetIr

**Purpose**

Get `ir` array of sparse matrix

**C Syntax**

```
#include "matrix.h"
int *mxGetIr(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to a sparse `mxArray`.

**Returns**

A pointer to the first element in the `ir` array, if successful, and `NULL` otherwise. Possible causes of failure include:

- Specifying a full (nonsparse) `mxArray`.
- Specifying a `NULL` `array_ptr`. (This usually means that an earlier call to `mxCreateSparse` failed.)

**Description**

Use `mxGetIr` to obtain the starting address of the `ir` array. The `ir` array is an array of integers; the length of the `ir` array is typically `nzmax` values. For example, if `nzmax` equals 100, then the `ir` array should contain 100 integers.

Each value in an `ir` array indicates a row (offset by 1) at which a nonzero element can be found. (The `jc` array is an index that indirectly specifies a column where nonzero elements can be found.)

For details on the `ir` and `jc` arrays, see `mxSetIr` and `mxSetJc`.

**Examples**

See `fulltosparse.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `explore.c` in the `mex` subdirectory of the `examples` directory; see `mxsetdimensions.c` and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxGetJc`, `mxGetNzmax`, `mxSetIr`, `mxSetJc`, `mxSetNzmax`

**Purpose**

Get jc array of sparse matrix

**C Syntax**

```
#include "matrix.h"
int *mxGetJc(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to a sparse mxArray.

**Returns**

A pointer to the first element in the jc array, if successful, and NULL otherwise. The most likely cause of failure is specifying an array_ptr that points to a full (nonsparse) mxArray.

**Description**

Use mxGetJc to obtain the starting address of the jc array. The jc array is an integer array having n+1 elements where n is the number of columns in the sparse mxArray. The values in the jc array indirectly indicate columns containing nonzero elements. For a detailed explanation of the jc array, see mxSetJc.

**Examples**

See fulltosparse.c in the refbook subdirectory of the examples directory.

For additional examples, see explore.c in the mex subdirectory of the examples directory; see mxgetnzmax.c, mxsetdimensions.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

**See Also**

mxGetIr, mxSetIr, mxSetJc

# mxGetLogicals

**Purpose**

Get pointer to logical array data

**C Syntax**

```
#include "matrix.h"
mxLogical *mxGetLogicals(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

The address of the first logical in the `mxArray`. Returns `NULL` if the specified array is not a logical array.

**Description**

Call `mxGetLogicals` to determine the address of the first logical element in the `mxArray` that `array_ptr` points to. Once you have the starting address, you can access any other element in the `mxArray`.

**See Also**

`mxIsLogical`, `mxIsLogicalScalar`, `mxIsLogicalScalarTrue`, `mxCreateLogicalScalar`, `mxCreateLogicalMatrix`, `mxCreateLogicalArray`

## Purpose

Get number of rows in mxArray

## C Syntax

```
#include "matrix.h"
int mxGetM(const mxArray *array_ptr);
```

## Arguments

array_ptr
Pointer to an array.

## Returns

The number of rows in the mxArray to which array_ptr points.

## Description

mxGetM returns the number of rows in the specified array. The term *rows* always means the first dimension of the array no matter how many dimensions the array has. For example, if array_ptr points to a four-dimensional array having dimensions 8-by-9-by-5-by-3, then mxGetM returns 8.

## Examples

See convec.c in the refbook subdirectory of the examples directory.

For additional examples, see fulltosparse.c, revord.c, timestwo.c, and xtimesy.c in the refbook subdirectory of the examples directory; see mxmalloc.c and mxsetdimensions.c in the mx subdirectory of the examples directory; see mexget.c, mexlock.c, mexsettrapflag.c, and yprime.c in the mex subdirectory of the examples directory.

## See Also

mxGetN, mxSetM, mxSetN

# mxGetN

**Purpose**

Get total number of columns in mxArray

**C Syntax**

```
#include "matrix.h"
int mxGetN(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

The number of columns in the mxArray.

**Description**

Call mxGetN to determine the number of columns in the specified mxArray.

If array_ptr is an N-dimensional mxArray, mxGetN is the product of dimensions 2 through N. For example, if array_ptr points to a four-dimensional mxArray having dimensions 13-by-5-by-4-by-6, then mxGetN returns the value 120 (5x4x6). If the specified mxArray has more than two dimensions and you need to know exactly how many elements are in each dimension, then call mxGetDimensions.

If array_ptr points to a sparse mxArray, mxGetN still returns the number of columns, not the number of occupied columns.

**Examples**

See convec.c in the refbook subdirectory of the examples directory.

For additional examples,

- See fulltosparse.c, revord.c, timestwo.c, and xtimesy.c in the refbook subdirectory of the examples directory.
- See explore.c, mexget.c, mexlock.c, mexsettrapflag.c and yprime.c in the mex subdirectory of the examples directory.
- See mxmalloc.c, mxsetdimensions.c, mxgetnzmax.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

**See Also**

mxGetM, mxGetNumberOfDimensions, mxSetM, mxSetN

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

# mxGetNaN

**Purpose** Get value of `NaN` (Not-a-Number)

**C Syntax**

```
#include "matrix.h"
double mxGetNaN(void);
```

**Returns** The value of `NaN` (Not-a-Number) on your system.

**Description** Call `mxGetNaN` to return the value of `NaN` for your system. `NaN` is the IEEE arithmetic representation for Not-a-Number. Certain mathematical operations return `NaN` as a result, for example,

- `0.0/0.0`
- `Inf-Inf`

The value of Not-a-Number is built in to the system. You cannot modify it.

**Examples** See `mxgetinf.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxGetEps`, `mxGetInf`

**Purpose** Get number of dimensions in mxArray

**C Syntax**

```
#include "matrix.h"
int mxGetNumberOfDimensions(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray

**Returns** The number of dimensions in the specified mxArray. The returned value is always 2 or greater.

**Description** Use mxGetNumberOfDimensions to determine how many dimensions are in the specified array. To determine how many elements are in each dimension, call mxGetDimensions.

**Examples** See explore.c in the mex subdirectory of the examples directory.

For additional examples, see findnz.c, fulltosparse.c, and phonebook.c in the refbook subdirectory of the examples directory; see mxcalcsinglesubscript.c, mxgeteps.c, and mxisfinite.c in the mx subdirectory of the examples directory.

**See Also** mxSetM, mxSetN, mxGetDimensions

# mxGetNumberOfElements

**Purpose** Get number of elements in mxArray

**C Syntax**

```
#include "matrix.h"
int mxGetNumberOfElements(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns** Number of elements in the specified mxArray.

**Description** mxGetNumberOfElements tells you how many elements an array has. For example, if the dimensions of an array are 3-by-5-by-10, then mxGetNumberOfElements will return the number 150.

**Examples** See findnz.c and phonebook.c in the refbook subdirectory of the examples directory.

For additional examples, see explore.c in the mex subdirectory of the examples directory; see mxcalcsinglesubscript.c, mxgeteps.c, mxgetinf.c, mxisfinite.c, and mxsetdimensions.c in the mx subdirectory of the examples directory.

**See Also** mxGetDimensions, mxGetM, mxGetN, mxGetClassID, mxGetClassName

**Purpose**

Get number of fields in structure mxArray

**C Syntax**

```
#include "matrix.h"
int mxGetNumberOfFields(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to a structure mxArray.

**Returns**

The number of fields, on success. Returns 0 on failure. The most common cause of failure is that array_ptr is not a structure mxArray. Call mxIsStruct to determine if array_ptr is a structure.

**Description**

Call mxGetNumberOfFields to determine how many fields are in the specified structure mxArray.

Once you know the number of fields in a structure, it is easy to loop through every field in order to set or to get field values.

**Examples**

See phonebook.c in the refbook subdirectory of the examples directory.

For additional examples, see mxisclass.c in the mx subdirectory of the examples directory; see explore.c in the mex subdirectory of the examples directory.

**See Also**

mxGetField, mxIsStruct, mxSetField

# mxGetNzmax

**Purpose** Get number of elements in `ir`, `pr`, and `pi` arrays

**C Syntax**

```
#include "matrix.h"
int mxGetNzmax(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to a sparse `mxArray`.

**Returns**

The number of elements allocated to hold nonzero entries in the specified sparse `mxArray`, on success. Returns an indeterminate value on error. The most likely cause of failure is that `array_ptr` points to a full (nonsparse) `mxArray`.

**Description**

Use `mxGetNzmax` to get the value of the `nzmax` field. The `nzmax` field holds an integer value that signifies the number of elements in the `ir`, `pr`, and, if it exists, the `pi` arrays. The value of `nzmax` is always greater than or equal to the number of nonzero elements in a sparse `mxArray`. In addition, the value of `nzmax` is always less than or equal to the number of rows times the number of columns.

As you adjust the number of nonzero elements in a sparse `mxArray`, MATLAB often adjusts the value of the `nzmax` field. MATLAB adjusts `nzmax` in order to reduce the number of costly reallocations and in order to optimize its use of heap space.

**Examples**

See `mxgetnzmax.c` and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxSetNzmax`

**Purpose**

Get imaginary data elements in mxArray

**C Syntax**

```
#include "matrix.h"
double *mxGetPi(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

The imaginary data elements of the specified mxArray, on success. Returns NULL if there is no imaginary data or if there is an error.

**Description**

The pi field points to an array containing the imaginary data of the mxArray. Call mxGetPi to get the contents of the pi field; that is, to get the starting address of this imaginary data.

The best way to determine if an mxArray is purely real is to call mxIsComplex.

The imaginary parts of all input matrices to a MATLAB function are allocated if any of the input matrices are complex.

**Examples**

See convec.c, findnz.c, and fulltosparse.c in the refbook subdirectory of the examples directory.

For additional examples, see explore.c and mexcallmatlab.c in the mex subdirectory of the examples directory; see mxcalcsinglesubscript.c, mxgetinf.c, mxisfinite.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

**See Also**

mxGetPr, mxSetPi, mxSetPr

# mxGetPr

**Purpose**
Get real data elements in mxArray

**C Syntax**

```
#include "matrix.h"
double *mxGetPr(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**
The address of the first element of the real data. Returns NULL if there is no real data.

**Description**
Call mxGetPr to determine the starting address of the real data in the mxArray that array_ptr points to. Once you have the starting address, you can access any other element in the mxArray.

**Examples**
See convec.c, doubleelement.c, findnz.c, fulltosparse.c, sincall.c, timestwo.c, timestwoalt.c, and xtimesy.c in the refbook subdirectory of the examples directory.

**See Also**
mxGetPi, mxSetPi, mxSetPr

**Purpose** Get real component of first data element in mxArray

**C Syntax**

```
#include "matrix.h"
double mxGetScalar(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray other than a cell mxArray or a structure mxArray.

**Returns**

The value of the first real (nonimaginary) element of the mxArray. Notice that mxGetScalar returns a double. Therefore, if real elements in the mxArray are stored as something other than doubles, mxGetScalar automatically converts the scalar value into a double. To preserve the original data representation of the scalar, you must cast the return value to the desired data type.

If array_ptr points to a structure mxArray or a cell mxArray, mxGetScalar returns 0.0.

If array_ptr points to a sparse mxArray, mxGetScalar returns the value of the first nonzero real element in the mxArray.

If array_ptr points to an empty mxArray, mxGetScalar returns an indeterminate value.

**Description**

Call mxGetScalar to get the value of the first real (nonimaginary) element of the mxArray.

In most cases, you call mxGetScalar when array_ptr points to an mxArray containing only one element (a scalar). However, array_ptr can point to an mxArray containing many elements. If array_ptr points to an mxArray containing multiple elements, mxGetScalar returns the value of the first real element. If array_ptr points to a two-dimensional mxArray, mxGetScalar returns the value of the (1,1) element; if array_ptr points to a three-dimensional mxArray, mxGetScalar returns the value of the (1,1,1) element; and so on.

**Examples**

See timestwoalt.c and xtimesy.c in the refbook subdirectory of the examples directory.

For additional examples, see `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory; see `mexget.c`, `mexlock.c` and `mexsettrapflag.c` in the `mex` subdirectory of the `examples` directory.

### See Also

`mxGetM`, `mxGetN`

**Purpose** Copy string mxArray to C-style string

**C Syntax**

```
#include "matrix.h"
int mxGetString(const mxArray *array_ptr, char *buf, int buflen);
```

**Arguments**

array_ptr
Pointer to a string mxArray; that is, a pointer to an mxArray having the mxCHAR_CLASS class.

buf
The starting location into which the string should be written. mxGetString writes the character data into buf and then terminates the string with a NULL character (in the manner of C strings). buf can either point to dynamic or static memory.

buflen
Maximum number of characters to read into buf. Typically, you set buflen to 1 plus the number of elements in the string mxArray to which array_ptr points. See the mxGetM and mxGetN reference pages to find out how to get the number of elements.

---

**Note** Users of multibyte character sets should be aware that MATLAB packs multibyte characters into an mxChar (16-bit unsigned integer). When allocating space for the return string, to avoid possible truncation you should set

```
buflen = (mxGetM(prhs[0]) * mxGetN(prhs[0]) * sizeof(mxChar)) + 1
```

---

**Returns** 0 on success, and 1 on failure. Possible reasons for failure include:

- Specifying an mxArray that is not a string mxArray.
- Specifying buflen with less than the number of characters needed to store the entire mxArray pointed to by array_ptr. If this is the case, 1 is returned and the string is truncated.

# mxGetString

## Description

Call `mxGetString` to copy the character data of a string `mxArray` into a C-style string. The copied C-style string starts at `buf` and contains no more than `buflen-1` characters. The C-style string is always terminated with a `NULL` character.

If the string array contains several rows, they are copied, one column at a time, into one long string array.

## Examples

See `revord.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `explore.c` in the `mex` subdirectory of the `examples` directory; see `mxmalloc.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxCreateCharArray`, `mxCreateCharMatrixFromStrings`, `mxCreateString`

**Purpose**
Determine if input is cell `mxArray`

**C Syntax**

```
#include "matrix.h"
bool mxIsCell(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an array.

**Returns**
Logical `1` (`true`) if `array_ptr` points to an array having the class `mxCELL_CLASS`, and logical `0` (`false`) otherwise.

**Description**
Use `mxIsCell` to determine if the specified array is a cell array.

Calling `mxIsCell` is equivalent to calling

```
mxGetClassID(array_ptr) == mxCELL_CLASS
```

---

**Note** `mxIsCell` does not answer the question, “Is this `mxArray` a cell of a cell array?”. An individual cell of a cell array can be of any type.

---

**See Also**
`mxIsClass`

# mxIsChar

**Purpose**

Determine if input is string mxArray

**C Syntax**

```
#include "matrix.h"
bool mxIsChar(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

Logical 1 (true) if array_ptr points to an array having the class mxCHAR_CLASS, and logical 0 (false) otherwise.

**Description**

Use mxIsChar to determine if array_ptr points to string mxArray.

Calling mxIsChar is equivalent to calling

```
mxGetClassID(array_ptr) == mxCHAR_CLASS
```

**Examples**

See phonebook.c and revord.c in the refbook subdirectory of the examples directory.

For additional examples, see mxcreatecharmatrixfromstr.c, mxislogical.c, and mxmalloc.c in the mx subdirectory of the examples directory.

**See Also**

mxIsClass, mxGetClassID

**Purpose**

Determine if mxArray is member of specified class

**C Syntax**

```
#include "matrix.h"
bool mxIsClass(const mxArray *array_ptr, const char *name);
```

**Arguments**

array_ptr
Pointer to an array.

name
The array category that you are testing. Specify name as a string (not as an integer identifier). You can specify any one of the following predefined constants:

| Value of Name | Corresponding Class |
|---|---|
| cell | mxCELL_CLASS |
| char | mxCHAR_CLASS |
| double | mxDOUBLE_CLASS |
| function handle | mxFUNCTION_CLASS |
| int8 | mxINT8_CLASS |
| int16 | mxINT16_CLASS |
| int32 | mxINT32_CLASS |
| int64 | mxINT64_CLASS |
| logical | mxLOGICAL_CLASS |
| single | mxSINGLE_CLASS |
| struct | mxSTRUCT_CLASS |
| uint8 | mxUINT8_CLASS |
| uint16 | mxUINT16_CLASS |
| uint32 | mxUINT32_CLASS |
| uint64 | mxUINT64_CLASS |

| Value of Name | Corresponding Class |
|---|---|
| *<class_name>* | *<class_id>* |
| unknown | mxUNKNOWN_CLASS |

In the table, *<class_name>* represents the name of a specific MATLAB custom object.

Or, you can specify one of your own class names.

For example,

```
mxIsClass("double");
```

is equivalent to calling

```
mxIsDouble(array_ptr);
```

which is equivalent to calling

```
strcmp(mxGetClassName(array_ptr), "double");
```

Note that it is most efficient to use the `mxIsDouble` form.

## Returns

Logical `1` (`true`) if `array_ptr` points to an array having category `name`, and logical `0` (`false`) otherwise.

## Description

Each `mxArray` is tagged as being a certain type. Call `mxIsClass` to determine if the specified `mxArray` has this type.

## Examples

See `mxisclass.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxIsEmpty`, `mxGetClassID`, `mxClassID`

**Purpose**

Determine if data is complex

**C Syntax**

```
#include "matrix.h"
bool mxIsComplex(const mxArray *array_ptr);
```

**Returns**

Logical 1 (true) if array_ptr is a numeric array containing complex data, and logical 0 (false) otherwise. If array_ptr points to a cell array or a structure array, then mxIsComplex returns false.

**Description**

Use mxIsComplex to determine whether or not an imaginary part is allocated for an mxArray. The imaginary pointer pi is NULL if an mxArray is purely real and does not have any imaginary data. If an mxArray is complex, pi points to an array of numbers.

**Examples**

See mxisfinite.c in the mx subdirectory of the examples directory.

For additional examples, see convec.c, phonebook.c, timestwo.c, and xtimesy.c in the refbook subdirectory of the examples directory; see explore.c, yprime.c, mexlock.c, and mexsettrapflag.c in the mex subdirectory of the examples directory; see mxcalcsinglesubscript.c, mxgeteps.c, and mxgetinf.c in the mx subdirectory of the examples directory.

**See Also**

mxIsNumeric

# mxIsDouble

## Purpose

Determine if `mxArray` represents data as double-precision, floating-point numbers

## C Syntax

```
#include "matrix.h"
bool mxIsDouble(const mxArray *array_ptr);
```

## Arguments

`array_ptr`
Pointer to an `mxArray`.

## Returns

Logical `1` (`true`) if the `mxArray` stores its data as double-precision, floating-point numbers, and logical `0` (`false`) otherwise.

## Description

Call `mxIsDouble` to determine whether or not the specified `mxArray` represents its real and imaginary data as double-precision, floating-point numbers.

Older versions of MATLAB store all `mxArray` data as double-precision, floating-point numbers. However, starting with MATLAB version 5, MATLAB can store real and imaginary data in a variety of numerical formats.

Calling `mxIsDouble` is equivalent to calling

```
mxGetClassID(array_ptr) == mxDOUBLE_CLASS
```

## Examples

See `findnz.c`, `fulltosparse.c`, `timestwo.c`, and `xtimesy.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mexget.c`, `mexlock.c`, `mexsettrapflag.c`, and `yprime.c` in the `mex` subdirectory of the `examples` directory; see `mxcalcsinglesubscript.c`, `mxgeteps.c`, `mxgetinf.c`, and `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxIsClass`, `mxGetClassID`

**Purpose** Determine if `mxArray` is empty

**C Syntax**

```
#include "matrix.h"
bool mxIsEmpty(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an array.

**Returns** Logical `1` (`true`) if the `mxArray` is empty, and logical `0` (`false`) otherwise.

**Description** Use `mxIsEmpty` to determine if an `mxArray` contains no data. An `mxArray` is empty if the size of any of its dimensions is 0.

Note that `mxIsEmpty` is not the opposite of `mxIsFull`.

**Examples** See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxIsClass`

# mxIsFinite

**Purpose**

Determine if input is finite

**C Syntax**

```
#include "matrix.h"
bool mxIsFinite(double value);
```

**Arguments**

`value`
The double-precision, floating-point number that you are testing.

**Returns**

Logical `1` (`true`) if `value` is finite, and logical `0` (`false`) otherwise.

**Description**

Call `mxIsFinite` to determine whether or not `value` is finite. A number is finite if it is greater than `-Inf` and less than `Inf`.

**Examples**

See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxIsInf`, `mxIsNaN`

**Purpose** Determine if `mxArray` was copied from MATLAB global workspace

**C Syntax**

```
#include "matrix.h"
bool mxIsFromGlobalWS(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns** Logical `1` (`true`) if the array was copied out of the global workspace, and logical `0` (`false`) otherwise.

**Description** `mxIsFromGlobalWS` is useful for stand-alone MAT programs. `mexIsGlobal` tells you if the pointer you pass actually points into the global workspace.

**Examples** See `matdgns.c` and `matcreat.c` in the `eng_mat` subdirectory of the `examples` directory.

**See Also** `mexIsGlobal`

# mxIsFull (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
if(!mxIsSparse(prhs[0]))
```

instead of

```
if(mxIsFull(prhs[0]))
```

**See Also** `mxIsSparse`

## Purpose

Determine if input is infinite

## C Syntax

```
#include "matrix.h"
bool mxIsInf(double value);
```

## Arguments

`value`
The double-precision, floating-point number that you are testing.

## Returns

Logical `1` (`true`) if value is infinite, and logical `0` (`false`) otherwise.

## Description

Call `mxIsInf` to determine whether or not `value` is equal to infinity or minus infinity. MATLAB stores the value of infinity in a permanent variable named `Inf`, which represents IEEE arithmetic positive infinity. The value of the variable, `Inf`, is built into the system; you cannot modify it.

Operations that return infinity include:

- Division by 0. For example, `5/0` returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

If `value` equals `NaN` (Not-a-Number), then `mxIsInf` returns `false`. In other words, `NaN` is not equal to infinity.

## Examples

See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxIsFinite`, `mxIsNaN`

# mxIsInt8

## Purpose

Determine if mxArray represents data as signed 8-bit integers

## C Syntax

```
#include "matrix.h"
bool mxIsInt8(const mxArray *array_ptr);
```

## Arguments

array_ptr
Pointer to an mxArray.

## Returns

Logical 1 (true) if the array stores its data as signed 8-bit integers, and logical 0 (false) otherwise.

## Description

Use mxIsInt8 to determine whether or not the specified array represents its real and imaginary data as 8-bit signed integers.

Calling mxIsInt8 is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT8_CLASS
```

## See Also

mxIsClass, mxGetClassID, mxIsInt16, mxIsInt32, mxIsInt64, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

**Purpose** Determine if `mxArray` represents data as signed 16-bit integers

**C Syntax**

```
#include "matrix.h"
bool mxIsInt16(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns** Logical `1` (`true`) if the array stores its data as signed 16-bit integers, and logical `0` (`false`) otherwise.

**Description** Use `mxIsInt16` to determine whether or not the specified array represents its real and imaginary data as 16-bit signed integers.

Calling `mxIsInt16` is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT16_CLASS
```

**See Also** `mxIsClass`, `mxGetClassID`, `mxIsInt8`, `mxIsInt32`, `mxIsInt64`, `mxIsUint8`, `mxIsUint16`, `mxIsUint32`, `mxIsUint64`

# mxIsInt32

**Purpose**

Determine if mxArray represents data as signed 32-bit integers

**C Syntax**

```
#include "matrix.h"
bool mxIsInt32(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

Logical 1 (true) if the array stores its data as signed 32-bit integers, and logical 0 (false) otherwise.

**Description**

Use mxIsInt32 to determine whether or not the specified array represents its real and imaginary data as 32-bit signed integers.

Calling mxIsInt32 is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT32_CLASS
```

**See Also**

mxIsClass, mxGetClassID, mxIsInt8, mxIsInt16, mxIsInt64, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

**Purpose** Determine if mxArray represents data as signed 64-bit integers

**C Syntax**

```
#include "matrix.h"
bool mxIsInt64(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns** Logical 1 (true) if the array stores its data as signed 64-bit integers, and logical 0 (false) otherwise.

**Description** Use mxIsInt64 to determine whether or not the specified array represents its real and imaginary data as 64-bit signed integers.

Calling mxIsInt64 is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT64_CLASS
```

**See Also** mxIsClass, mxGetClassID, mxIsInt8, mxIsInt16, mxIsInt32, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

# mxIsLogical

**Purpose**

Determine if `mxArray` is of class `mxLogical`

**C Syntax**

```
#include "matrix.h"
bool mxIsLogical(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

Logical `1` (`true`) if `array_ptr` points to a logical `mxArray`, and logical `0` (`false`) otherwise.

**Description**

Use `mxIsLogical` to determine whether MATLAB treats the data in the `mxArray` as Boolean (logical). If an `mxArray` is logical, then MATLAB treats all zeros as meaning `false` and all nonzero values as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

**Examples**

See `mxislogical.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxIsClass`, `mxSetLogical (Obsolete)`

# mxIsLogicalScalar

**Purpose** Determine if scalar `mxArray` is of class `mxLogical`

**C Syntax**

```
#include "matrix.h"
bool mxIsLogicalScalar(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns** Logical `1` (`true`) if the `mxArray` is of class `mxLogical` and has 1-by-1 dimensions, and logical `0` (`false`) otherwise.

**Description** Use `mxIsLogicalScalar` to determine whether MATLAB treats the scalar data in the `mxArray` as logical or numerical. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

`mxIsLogicalScalar(pa)` is equivalent to

```
mxIsLogical(pa) && mxGetNumberOfElements(pa) == 1
```

**See Also** `mxIsLogicalScalarTrue`, `mxIsLogical`, `mxGetLogicals`, `mxGetScalar`

# mxIsLogicalScalarTrue

**Purpose**

Determine if scalar `mxArray` of class `mxLogical` is `true`

**C Syntax**

```
#include "matrix.h"
bool mxIsLogicalScalarTrue(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

Logical `1` (`true`) if the value of the `mxArray's` logical, scalar element is `true`, and logical `0` (`false`) otherwise.

**Description**

Use `mxIsLogicalScalarTrue` to determine whether the value of a scalar `mxArray` is true or false. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

`mxIsLogicalScalarTrue(pa)` is equivalent to

```
mxIsLogical(pa) && mxGetNumberOfElements(pa) == 1 &&
mxGetLogicals(pa)[0] == true
```

**See Also**

`mxIsLogicalScalar`, `mxIsLogical`, `mxGetLogicals`, `mxGetScalar`

## Purpose

Determine if input is `NaN` (Not-a-Number)

## C Syntax

```
#include "matrix.h"
bool mxIsNaN(double value);
```

## Arguments

`value`
The double-precision, floating-point number that you are testing.

## Returns

Logical `1` (`true`) if `value` is `NaN` (Not-a-Number), and logical `0` (`false`) otherwise.

## Description

Call `mxIsNaN` to determine whether or not `value` is `NaN`. `NaN` is the IEEE arithmetic representation for Not-a-Number. A `NaN` is obtained as a result of mathematically undefined operations such as

- `0.0/0.0`
- `Inf-Inf`

The system understands a family of bit patterns as representing `NaN`. In other words, `NaN` is not a single value, rather it is a family of numbers that MATLAB (and other IEEE-compliant applications) use to represent an error condition or missing data.

## Examples

See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `findnz.c` and `fulltosparse.c` in the `refbook` subdirectory of the `examples` directory.

## See Also

`mxIsFinite`, `mxIsInf`

# mxIsNumeric

**Purpose** Determine if mxArray is numeric

**C Syntax**

```
#include "matrix.h"
bool mxIsNumeric(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

Logical 1 (true) if the array's storage type is:

- mxDOUBLE_CLASS
- mxSINGLE_CLASS
- mxINT8_CLASS
- mxUINT8_CLASS
- mxINT16_CLASS
- mxUINT16_CLASS
- mxINT32_CLASS
- mxUINT32_CLASS
- mxINT64_CLASS
- mxUINT64_CLASS

Logical 0 (false) if the array's storage type is:

- mxCELL_CLASS
- mxCHAR_CLASS
- mxFUNCTION_CLASS
- mxLOGICAL_CLASS
- mxSTRUCT_CLASS
- mxUNKNOWN_CLASS

**Description**

Call mxIsNumeric to determine if the specified array contains numeric data. If the specified array is a cell, string, or a structure, then mxIsNumeric returns logical 0 (false). Otherwise, mxIsNumeric returns logical 1 (true).

Call mxGetClassID to determine the exact storage type.

**Examples**

See phonebook.c in the refbook subdirectory of the examples directory.

**See Also**

mxGetClassID

**Purpose**

Determine if `mxArray` represents data as single-precision, floating-point numbers

**C Syntax**

```
#include "matrix.h"
bool mxIsSingle(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

Logical `1` (`true`) if the array stores its data as single-precision, floating-point numbers, and logical `0` (`false`) otherwise.

**Description**

Use `mxIsSingle` to determine whether or not the specified array represents its real and imaginary data as single-precision, floating-point numbers.

Calling `mxIsSingle` is equivalent to calling

```
mxGetClassID(array_ptr) == mxSINGLE_CLASS
```

**See Also**

`mxIsClass`, `mxGetClassID`

# mxIsSparse

**Purpose**

Determine if input is sparse mxArray

**C Syntax**

```
#include "matrix.h"
bool mxIsSparse(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

Logical 1 (true) if array_ptr points to a sparse mxArray, and logical 0 (false) otherwise. A false return value means that array_ptr points to a full mxArray or that array_ptr does not point to a legal mxArray.

**Description**

Use mxIsSparse to determine if array_ptr points to a sparse mxArray. Many routines (for example, mxGetIr and mxGetJc) require a sparse mxArray as input.

**Examples**

See phonebook.c in the refbook subdirectory of the examples directory.

For additional examples, see mxgetnzmax.c, mxsetdimensions.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

**See Also**

mxGetIr, mxGetJc

**Compatibility** This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
mxIsChar
```

instead of

```
mxIsString
```

**See Also** `mxChar`, `mxIsChar`

# mxIsStruct

**Purpose** Determine if input is structure mxArray

**C Syntax**

```
#include "matrix.h"
bool mxIsStruct(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns** Logical 1 (true) if array_ptr points to a structure array, and logical 0 (false) otherwise.

**Description** Use mxIsStruct to determine if array_ptr points to a structure mxArray. Many routines (for example, mxGetFieldName and mxSetField) require a structure mxArray as an argument.

**Examples** See phonebook.c in the refbook subdirectory of the examples directory.

**See Also** mxCreateStructArray, mxCreateStructMatrix, mxGetNumberOfFields, mxGetField, mxSetField

**Purpose**

Determine if mxArray represents data as unsigned 8-bit integers

**C Syntax**

```
#include "matrix.h"
bool mxIsUint8(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns**

Logical 1 (true) if the mxArray stores its data as unsigned 8-bit integers, and logical 0 (false) otherwise.

**Description**

Use mxIsUint8 to determine whether or not the specified mxArray represents its real and imaginary data as 8-bit unsigned integers.

Calling mxIsUint8 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT8_CLASS
```

**See Also**

mxIsClass, mxGetClassID, mxIsUint16, mxIsUint32, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

# mxIsUint16

## Purpose

Determine if mxArray represents data as unsigned 16-bit integers

## C Syntax

```
#include "matrix.h"
bool mxIsUint16(const mxArray *array_ptr);
```

## Arguments

array_ptr
Pointer to an mxArray.

## Returns

Logical 1 (true) if the mxArray stores its data as unsigned 16-bit integers, and logical 0 (false) otherwise.

## Description

Use mxIsUint16 to determine whether or not the specified mxArray represents its real and imaginary data as 16-bit unsigned integers.

Calling mxIsUint16 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT16_CLASS
```

## See Also

mxIsClass, mxGetClassID, mxIsUint8, mxIsUint32, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

**Purpose** Determine if mxArray represents data as unsigned 32-bit integers

**C Syntax**

```
#include "matrix.h"
bool mxIsUint32(const mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray.

**Returns** Logical 1 (true) if the mxArray stores its data as unsigned 32-bit integers, and logical 0 (false) otherwise.

**Description** Use mxIsUint32 to determine whether or not the specified mxArray represents its real and imaginary data as 32-bit unsigned integers.

Calling mxIsUint32 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT32_CLASS
```

**See Also** mxIsClass, mxGetClassID, mxIsUint8, mxIsUint16, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

# mxIsUint64

## Purpose

Determine if mxArray represents data as unsigned 64-bit integers

## C Syntax

```
#include "matrix.h"
bool mxIsUint64(const mxArray *array_ptr);
```

## Arguments

array_ptr
Pointer to an mxArray.

## Returns

Logical 1 (true) if the mxArray stores its data as unsigned 64-bit integers, and logical 0 (false) otherwise.

## Description

Use mxIsUint64 to determine whether or not the specified mxArray represents its real and imaginary data as 64-bit unsigned integers.

Calling mxIsUint64 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT64_CLASS
```

## See Also

mxIsClass, mxGetClassID, mxIsUint8, mxIsUint16, mxIsUint32, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

**Purpose** Allocate dynamic memory using MATLAB memory manager

**C Syntax**

```
#include "matrix.h"
#include <stdlib.h>
void *mxMalloc(size_t n);
```

**Arguments**

`n`
Number of bytes to allocate.

**Returns**

A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxMalloc` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxMalloc` is unsuccessful when there is insufficient free heap space.

**Description**

MATLAB applications should always call `mxMalloc` rather than `malloc` to allocate memory. Note that `mxMalloc` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxMalloc` automatically

- Allocates enough contiguous heap space to hold `n` bytes.
- Registers the returned heap space with the MATLAB memory management facility.

The MATLAB memory management facility maintains a list of all memory allocated by `mxMalloc`. The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

In stand-alone MATLAB applications, `mxMalloc` calls the ANSI C `malloc` function.

By default, in a MEX-file, `mxMalloc` generates nonpersistent `mxMalloc` data. In other words, the memory management facility automatically deallocates the memory as soon as the MEX-file ends. If you want the memory to persist after the MEX-file completes, call `mexMakeMemoryPersistent` after calling `mxMalloc`. If you write a MEX-file with persistent memory, be sure to register a `mexAtExit` function to free allocated memory in the event your MEX-file is cleared.

When you finish using the memory allocated by mxMalloc, call mxFree. mxFree deallocates the memory.

**Examples**

See mxmalloc.c in the mx subdirectory of the examples directory. For an additional example, see mxsetdimensions.c in the mx subdirectory of the examples directory.

**See Also**

mxCalloc, mxRealloc, mxFree, mxDestroyArray, mexMakeArrayPersistent, mexMakeMemoryPersistent

**Purpose** Reallocate memory

**C Syntax**

```
#include "matrix.h"
#include <stdlib.h>
void *mxRealloc(void *ptr, size_t size);
```

**Arguments**

`ptr`
Pointer to a block of memory allocated by `mxCalloc`, `mxMalloc`, or `mxRealloc`.

`size`
New size of allocated memory, in bytes.

**Returns**

A pointer to the reallocated block of memory, or `NULL` if `size` is 0. In a stand-alone (non-MEX-file) application, if not enough memory is available to expand the block to the given size, `mxRealloc` returns `NULL`. In a MEX-file, if not enough memory is available to expand the block to the given size, the MEX-file terminates and control returns to the MATLAB prompt.

**Description**

`mxRealloc` changes the size of a memory block that has been allocated with `mxCalloc`, `mxMalloc`, or `mxRealloc`.

If `size` is 0 and `ptr` is not `NULL`, `mxRealloc` frees the memory pointed to by `ptr` and returns `NULL`.

If `size` is greater than 0 and `ptr` is `NULL`, `mxRealloc` behaves like `mxMalloc`, allocating a new block of memory of `size` bytes and returning a pointer to the new block.

Otherwise, `mxRealloc` changes the size of the memory block pointed to by `ptr` to `size` bytes. The contents of the reallocated memory are unchanged up to the smaller of the new and old sizes. The reallocated memory may be in a different location from the original memory, so the returned pointer can be different from `ptr`. If the memory location changes, `mxRealloc` frees the original memory block pointed to by `ptr`.

In a stand-alone (non-MEX-file) application, if not enough memory is available to expand the block to the given size, `mxRealloc` returns `NULL` and leaves the original memory block unchanged. You must use `mxFree` to free the original memory block.

MATLAB maintains a list of all memory allocated by `mxRealloc`. By default, in a MEX-file, `mxRealloc` generates nonpersistent `mxRealloc` data. The memory management facility automatically deallocates the memory as soon as the MEX-file ends.

If you want the memory to persist after a MEX-file completes, call `mexMakeMemoryPersistent` after calling `mxRealloc`. If you write a MEX-file with persistent memory, be sure to register a `mexAtExit` function to free allocated memory when your MEX-file is cleared.

When you finish using the memory allocated by `mxRealloc`, call `mxFree`. `mxFree` deallocates the memory.

## Examples

See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxCalloc`, `mxFree`, `mxMalloc`

**Purpose** Remove field from structure array

**C Syntax**

```
#include "matrix.h"
extern void mxRemoveField(mxArray array_ptr, int field_number);
```

**Arguments**

`array_ptr`
Pointer to a structure `mxArray`.

`field_number`
The number of the field you want to remove. For instance, to remove the first field, set `field_number` to 0; to remove the second field, set `field_number` to 1; and so on.

**Description**

Call `mxRemoveField` to remove a field from a structure array. If the field does not exist, nothing happens. This function does not destroy the field values. Use `mxDestroyArray` to destroy the actual field values.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number 0 represents the field `name`; field number 1 represents field `billing`; field number 2 represents field `test`.

**See Also**

`mxAddField`, `mxDestroyArray`, `mxGetFieldByNumber`

# mxSetCell

**Purpose**

Set value of one cell of mxArray

**C Syntax**

```
#include "matrix.h"
void mxSetCell(mxArray *array_ptr, int index, mxArray *value);
```

**Arguments**

`array_ptr`
Pointer to a cell `mxArray`.

`index`
Index from the beginning of the `mxArray`. Specify the number of elements between the first cell of the `mxArray` and the cell you want to set. The easiest way to calculate `index` in a multidimensional cell array is to call `mxCalcSingleSubscript`.

`value`
The new value of the cell. You can put any kind of `mxArray` into a cell. In fact, you can even put another cell `mxArray` into a cell.

**Description**

Call `mxSetCell` to put the designated `value` into a particular cell of a cell `mxArray`.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetCell` before you call `mxSetCell`.

**Examples**

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory. For an additional example, see `mxcreatecellmatrix.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mxCreateCellArray`, `mxCreateCellMatrix`, `mxGetCell`, `mxIsCell`, `mxFree`

**Purpose** Convert structure array to MATLAB object array

**C Syntax**

```
#include "matrix.h"
int mxSetClassName(mxArray *array_ptr, const char *classname);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray` of class `mxSTRUCT_CLASS`.

`classname`
The object class to which to convert `array_ptr`.

**Returns** 0 if successful, and nonzero otherwise.

**Description** `mxSetClassName` converts a structure array to an object array, to be saved subsequently to a MAT-file. The object is not registered or validated by MATLAB until it is loaded via the `LOAD` command. If the specified classname is an undefined class within MATLAB, `LOAD` converts the object back to a simple structure array.

**See Also** `mxIsClass`, `mxGetClassID`

# mxSetData

## Purpose

Set pointer to data

## C Syntax

```
#include "matrix.h"
void mxSetData(mxArray *array_ptr, void *data_ptr);
```

## Arguments

`array_ptr`
Pointer to an `mxArray`.

`data_ptr`
Pointer to data.

## Description

`mxSetData` is similar to `mxSetPr`, except its `data_ptr` argument is a `void *`. Use this on numeric arrays with contents other than `double`.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetData` before you call `mxSetData`.

## See Also

`mxSetPr`, `mxGetData`, `mxFree`

**Purpose**

Modify number of dimensions and size of each dimension

**C Syntax**

```
#include "matrix.h"
int mxSetDimensions(mxArray *array_ptr, const int *dims, int ndim);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims[0]` to 5 and `dims[1]` to 7 establishes a 5-by-7 `mxArray`. In most cases, there should be `ndim` elements in the `dims` array.

`ndim`
The desired number of dimensions.

**Returns**

0 on success, and 1 on failure. `mxSetDimensions` allocates heap space to hold the input size array. So it is possible (though extremely unlikely) that increasing the number of dimensions can cause the system to run out of heap space.

**Description**

Call `mxSetDimensions` to reshape an existing `mxArray`. `mxSetDimensions` is similar to `mxSetM` and `mxSetN`; however, `mxSetDimensions` provides greater control for reshaping `mxArrays` that have more than two-dimensions.

`mxSetDimensions` does not allocate or deallocate any space for the `pr` or `pi` arrays. Consequently, if your call to `mxSetDimensions` increases the number of elements in the `mxArray`, then you must enlarge the `pr` (and `pi`, if it exists) arrays accordingly.

If your call to `mxSetDimensions` reduces the number of elements in the `mxArray`, then you can optionally reduce the size of the `pr` and `pi` arrays using `mxRealloc`.

Any trailing singleton dimensions specified in the `dims` argument are automatically removed from the resulting array. For example, if `ndim` equals `5` and `dims` equals `[4 1 7 1 1]`, the resulting array is given the dimensions 4-by-1-by-7.

**Examples**

See `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory.

## See Also

mxGetNumberOfDimensions, mxSetM, mxSetN, mxRealloc

**Purpose**

Set structure array field, given field name and index

**C Syntax**

```
#include "matrix.h"
void mxSetField(mxArray *array_ptr, int index,
    const char *field_name, mxArray *value);
```

**Arguments**

`array_ptr`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of 0, the second element has an index of 1, and the last element has an index of `N-1`, where `N` is the total number of elements in the structure `mxArray`. See `mxCalcSingleSubscript` for details on calculating an index.

`field_name`
The name of the field whose value you are assigning. Call `mxGetFieldNameByNumber` or `mxGetFieldNumber` to determine existing field names.

`value`
Pointer to the `mxArray` you are assigning.

**Description**

Use `mxSetField` to assign a `value` to the specified element of the specified field. In pseudo-C terminology, `mxSetField` performs the assignment

```
array_ptr[index].field_name = value;
```

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxSetField(pa, index, "field_name", new_value_pa);
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxSetFieldByNumber(pa, index, field_num, new_value_pa);
```

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetField` before you call `mxSetField`.

## Examples

See `mxcreatestructarray.c` in the `mx` subdirectory of the `examples` directory.

## See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetFieldByNumber`, `mxFree`

**Purpose**

Set structure array field, given field number and index

**C Syntax**

```
#include "matrix.h"
void mxSetFieldByNumber(mxArray *array_ptr, int index,
     int field_number, mxArray *value);
```

**Arguments**

`array_ptr`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of 0, the second element has an index of 1, and the last element has an index of `N-1`, where `N` is the total number of elements in the structure `mxArray`. See `mxCalcSingleSubscript` for details on calculating an index.

`field_number`
The position of the field whose value you want to extract. The first field within each element has a `field_number` of 0, the second field has a `field_number` of 1, and so on. The last field has a `field_number` of `N-1`, where `N` is the number of fields.

`value`
The value you are assigning.

**Description**

Use `mxSetFieldByNumber` to assign a `value` to the specified element of the specified field. `mxSetFieldByNumber` is almost identical to `mxSetField`; however, the former takes a field number as its third argument and the latter takes a field name as its third argument.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxSetField(pa, index, "field_name", new_value_pa);
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxSetFieldByNumber(pa, index, field_num, new_value_pa);
```

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetFieldByNumber` before you call `mxSetFieldByNumber`.

## Examples

See `mxcreatestructarray.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

## See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`, `mxFree`

**Purpose** Set imaginary data pointer for mxArray

**C Syntax**

```
#include "matrix.h"
void mxSetImagData(mxArray *array_ptr, void *pi);
```

**Arguments**

`array_ptr`
Pointer to an mxArray.

`pi`
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory. If `pi` points to static memory, memory errors will result when the array is destroyed.

**Description**

`mxSetImagData` is similar to `mxSetPi`, except its `pi` argument is a `void *`. Use this on numeric arrays with contents other than `double`.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetImagData` before you call `mxSetImagData`.

**Examples** See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxSetPi`, `mxGetImagData`, `mxFree`

# mxSetIr

**Purpose**

Set ir array of sparse mxArray

**C Syntax**

```
#include "matrix.h"
void mxSetIr(mxArray *array_ptr, int *ir);
```

**Arguments**

array_ptr
Pointer to a sparse mxArray.

ir
Pointer to the ir array. The ir array must be sorted in column-major order.

**Description**

Use mxSetIr to specify the ir array of a sparse mxArray. The ir array is an array of integers; the length of the ir array should equal the value of nzmax.

Each element in the ir array indicates a row (offset by 1) at which a nonzero element can be found. (The jc array is an index that indirectly specifies a column where nonzero elements can be found. See mxSetJc for more details on jc.)

For example, suppose you create a 7-by-3 sparse mxArray named Sparrow containing six nonzero elements by typing

```
Sparrow = zeros(7,3);
Sparrow(2,1) = 1;
Sparrow(5,1) = 1;
Sparrow(3,2) = 1;
Sparrow(2,3) = 2;
Sparrow(5,3) = 1;
Sparrow(6,3) = 1;
Sparrow = sparse(Sparrow);
```

The pr array holds the real data for the sparse matrix, which in Sparrow is the five 1s and the one 2. If there is any nonzero imaginary data, then it is in a pi array.

| Subscript | ir | pr | jc | Comments |
|---|---|---|---|---|
| `(2,1)` | 1 | 1 | 0 | Column 1; `ir` is 1 because row is 2. |
| `(5,1)` | 4 | 1 | 2 | Column 1; `ir` is 4 because row is 5. |
| `(3,2)` | 2 | 1 | 3 | Column 2; `ir` is 2 because row is 3. |
| `(2,3)` | 1 | 2 | 6 | Column 3; `ir` is 1 because row is 2. |
| `(5,3)` | 4 | 1 | | Column 3; `ir` is 4 because row is 5. |
| `(6,3)` | 5 | 1 | | Column 3; `ir` is 5 because row is 6. |

Notice how each element of the `ir` array is always 1 less than the row of the corresponding nonzero element. For instance, the first nonzero element is in row 2; therefore, the first element in `ir` is 1 (that is, 2-1). The second nonzero element is in row 5; therefore, the second element in `ir` is 4 (5-1).

The `ir` array must be in column-major order. That means that the `ir` array must define the row positions in column 1 (if any) first, then the row positions in column 2 (if any) second, and so on through column N. Within each column, row position 1 must appear prior to row position 2, and so on.

`mxSetIr` does not sort the `ir` array for you; you must specify an `ir` array that is already sorted.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetIr` before you call `mxSetIr`.

## Examples

See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `explore.c` in the `mex` subdirectory of the `examples` directory.

## See Also

`mxCreateSparse`, `mxGetIr`, `mxGetJc`, `mxSetJc`, `mxFree`

# mxSetJc

**Purpose**

Set `jc` array of sparse `mxArray`

**C Syntax**

```
#include "matrix.h"
void mxSetJc(mxArray *array_ptr, int *jc);
```

**Arguments**

`array_ptr`
Pointer to a sparse `mxArray`.

`jc`
Pointer to the `jc` array.

**Description**

Use `mxSetJc` to specify a new `jc` array for a sparse `mxArray`. The `jc` array is an integer array having `n+1` elements where `n` is the number of columns in the sparse `mxArray`. The values in the `jc` array have the meanings:

- `jc[j]` is the index in `ir`, `pr` (and `pi` if it exists) of the first nonzero entry in the jth column.
- `jc[j+1]-1` is the index of the last nonzero entry in the jth column.
- `jc`[number of columns `+ 1`] is equal to `nnz`, which is the number of nonzero entries in the entire spare `mxArray`.

The number of nonzero elements in any column (denoted as column C) is

```
jc[C] - jc[C-1];
```

For example, consider a 7-by-3 sparse `mxArray` named `Sparrow` containing six nonzero elements, created by typing

```
Sparrow = zeros(7,3);
Sparrow(2,1) = 1;
Sparrow(5,1) = 1;
Sparrow(3,2) = 1;
Sparrow(2,3) = 2;
Sparrow(5,3) = 1;
Sparrow(6,3) = 1;
Sparrow = sparse(Sparrow);
```

The contents of the ir, jc, and pr arrays are:

| Subscript | ir | pr | jc | Comment |
|---|---|---|---|---|
| (2,1) | 1 | 1 | 0 | Column 1 contains two entries, at ir[0],ir[1] |
| (5,1) | 4 | 1 | 2 | Column 2 contains one entry, at ir[2] |
| (3,2) | 2 | 1 | 3 | Column 3 contains three entries, at ir[3],ir[4], ir[5] |
| (2,3) | 1 | 2 | 6 | There are six nonzero elements. |
| (5,3) | 4 | 1 | | |
| (6,3) | 5 | 1 | | |

As an example of a much sparser mxArray, consider an 8,000 element sparse mxArray named Spacious containing only three nonzero elements. The ir, pr, and jc arrays contain:

| Subscript | ir | pr | jc | Comment |
|---|---|---|---|---|
| (73,2) | 72 | 1 | 0 | Column 1 contains zero entries |
| (50,3) | 49 | 1 | 0 | Column 2 contains one entry, at ir[0] |
| (64,5) | 63 | 1 | 1 | Column 3 contains one entry, at ir[1] |
| | | | 2 | Column 4 contains zero entries. |
| | | | 2 | Column 5 contains one entry, at ir[3] |
| | | | 3 | Column 6 contains zero entries. |
| | | | 3 | Column 7 contains zero entries. |
| | | | 3 | Column 8 contains zero entries. |
| | | | 3 | There are three nonzero elements. |

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetJc` before you call `mxSetJc`.

### Examples

See `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `explore.c` in the `mex` subdirectory of the `examples` directory.

### See Also

`mxGetIr`, `mxGetJc`, `mxSetIr`, `mxFree`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

This function turns on an `mxArray's` logical flag. This flag tells MATLAB that the array's data is to be treated as Boolean. If the logical flag is on, then MATLAB treats a `0` value as meaning `false` and a nonzero value as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

**See Also**

`mxCreateLogicalScalar`, `mxCreateLogicalMatrix`, `mxCreateLogicalArray`, `mxCreateSparseLogicalMatrix`

# mxSetM

**Purpose** Set number of rows in mxArray

**C Syntax**

```
#include "matrix.h"
void mxSetM(mxArray *array_ptr, int m);
```

**Arguments**

`m`
The desired number of rows.

`array_ptr`
Pointer to an `mxArray`.

**Description** Call `mxSetM` to set the number of rows in the specified `mxArray`. The term “rows” means the first dimension of an `mxArray`, regardless of the number of dimensions. Call `mxSetN` to set the number of columns.

You typically use `mxSetM` to change the shape of an existing `mxArray`. Note that `mxSetM` does not allocate or deallocate any space for the `pr`, `pi`, `ir`, or `jc` arrays. Consequently, if your calls to `mxSetM` and `mxSetN` increase the number of elements in the `mxArray`, then you must enlarge the `pr`, `pi`, `ir`, and/or `jc` arrays. Call `mxRealloc` to enlarge them.

If your calls to `mxSetM` and `mxSetN` end up reducing the number of elements in the `mxArray`, then you may want to reduce the sizes of the `pr`, `pi`, `ir`, and/or `jc` arrays in order to use heap space more efficiently. However, reducing the size is not mandatory.

**Examples** See `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `sincall.c` in the `refbook` subdirectory of the `examples` directory.

**See Also** `mxGetM`, `mxGetN`, `mxSetN`

## Purpose

Set number of columns in mxArray

## C Syntax

```
#include "matrix.h"
void mxSetN(mxArray *array_ptr, int n);
```

## Arguments

array_ptr
Pointer to an mxArray.

n
The desired number of columns.

## Description

Call mxSetN to set the number of columns in the specified mxArray. The term "columns" always means the second dimension of a matrix. Calling mxSetN forces an mxArray to have two dimensions. For example, if array_ptr points to an mxArray having three dimensions, calling mxSetN reduces the mxArray to two dimensions.

You typically use mxSetN to change the shape of an existing mxArray. Note that mxSetN does not allocate or deallocate any space for the pr, pi, ir, or jc arrays. Consequently, if your calls to mxSetN and mxSetM increase the number of elements in the mxArray, then you must enlarge the pr, pi, ir, and/or jc arrays.

If your calls to mxSetM and mxSetN end up reducing the number of elements in the mxArray, then you may want to reduce the sizes of the pr, pi, ir, and/or jc arrays in order to use heap space more efficiently. However, reducing the size is not mandatory.

## Examples

See mxsetdimensions.c in the mx subdirectory of the examples directory. For an additional example, see sincall.c in the refbook subdirectory of the examples directory.

## See Also

mxGetM, mxGetN, mxSetM

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the -V5 option of the mex script.

### Replacing mxSetName when used with mexPutArray

To copy an mxArray to a workspace, use

```
mexPutVariable(workspace, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
mexPutArray(array_ptr, workspace);
```

### Replacing mxSetName when used with matPutArray

To write an mxArray to a MAT-file, use

```
matPutVariable(mfp, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
matPutArray(mfp, array_ptr);
```

### Replacing mxSetName when used with engPutArray

To copy an mxArray into the workspace of a MATLAB engine, use

```
engPutVariable(ep, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
engPutArray(ep, array_ptr);
```

**Purpose** Set storage space for nonzero elements

**C Syntax**

```
#include "matrix.h"
void mxSetNzmax(mxArray *array_ptr, int nzmax);
```

**Arguments**

`array_ptr`
Pointer to a sparse `mxArray`.

`nzmax`
The number of elements that `mxCreateSparse` should allocate to hold the arrays pointed to by `ir`, `pr`, and `pi` (if it exists). Set `nzmax` greater than or equal to the number of nonzero elements in the `mxArray`, but set it to be less than or equal to the number of rows times the number of columns. If you specify an `nzmax` value of 0, `mxSetNzmax` sets the value of `nzmax` to 1.

**Description**

Use `mxSetNzmax` to assign a new value to the `nzmax` field of the specified sparse `mxArray`. The `nzmax` field holds the maximum possible number of nonzero elements in the sparse `mxArray`.

The number of elements in the `ir`, `pr`, and `pi` (if it exists) arrays must be equal to `nzmax`. Therefore, after calling `mxSetNzmax`, you must change the size of the `ir`, `pr`, and `pi` arrays. To change the size of one of these arrays:

1. Call `mxCalloc`, setting `n` to the new value of `nzmax`.
2. Call the ANSI C routine `memcpy` to copy the contents of the old array to the new area allocated in Step 1.
3. Call `mxFree` to free the memory occupied by the old array.
4. Call the appropriate `mxSet` routine (`mxSetIr`, `mxSetPr`, or `mxSetPi`) to establish the new memory area as the current one.

Two ways of determining how big you should make `nzmax` are

- Set `nzmax` equal to or slightly greater than the number of nonzero elements in a sparse `mxArray`. This approach conserves precious heap space.
- Make `nzmax` equal to the total number of elements in an `mxArray`. This approach eliminates (or, at least reduces) expensive reallocations.

**Examples** See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxGetNzmax`

## Purpose

Set new imaginary data for mxArray

## C Syntax

```
#include "matrix.h"
void mxSetPi(mxArray *array_ptr, double *pi);
```

## Arguments

array_ptr
Pointer to a full (nonsparse) mxArray.

pi
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call mxCalloc to allocate this dynamic memory. If pi points to static memory, memory leaks and other memory errors may result.

## Description

Use mxSetPi to set the imaginary data of the specified mxArray.

Most mxCreate functions optionally allocate heap space to hold imaginary data. If you tell an mxCreate function to allocate heap space (for example, by setting the ComplexFlag to mxComplex or by setting pi to a non-NULL value), then you do not ordinarily use mxSetPi to initialize the created mxArray's imaginary elements. Rather, you call mxSetPi to replace the initial imaginary values with new ones.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call mxFree on the pointer returned by mxGetPi before you call mxSetPi.

## Examples

See mxisfinite.c and mxsetnzmax.c in the mx subdirectory of the examples directory.

## See Also

mxSetImagData, mxGetPi, mxGetPr, mxSetPr, mxFree

# mxSetPr

**Purpose** Set new real data for `mxArray`

**C Syntax**

```
#include "matrix.h"
void mxSetPr(mxArray *array_ptr, double *pr);
```

**Arguments**

`array_ptr`
Pointer to a full (nonsparse) `mxArray`.

`pr`
Pointer to the first element of an array. Each element in the array contains the real component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory. If `pr` points to static memory, then memory leaks and other memory errors may result.

**Description** Use `mxSetPr` to set the real data of the specified `mxArray`.

All `mxCreate` calls allocate heap space to hold real data. Therefore, you do not ordinarily use `mxSetPr` to initialize the real elements of a freshly-created `mxArray`. Rather, you call `mxSetPr` to replace the initial real values with new ones.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetPr` before you call `mxSetPr`.

**Examples** See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mxGetPr`, `mxGetPi`, `mxSetPi`, `mxFree`

# MEX-Files (C)

| | |
|---|---|
| `mexAddFlops (Obsolete)` | Update MATLAB internal floating-point operations counter |
| `mexAtExit` | Register function to be called when MEX-function cleared or MATLAB terminates |
| `mexCallMATLAB` | Call MATLAB function or user-defined M-file or MEX-file |
| `mexErrMsgIdAndTxt` | Issue error message with identifier and return to MATLAB |
| `mexErrMsgTxt` | Issue error message and return to MATLAB |
| `mexEvalString` | Execute MATLAB command in caller's workspace |
| `mexFunction` | Entry point to C MEX-file |
| `mexFunctionName` | Name of current MEX-function |
| `mexGet` | Get value of Handle Graphics® property |
| `mexGetArray (Obsolete)` | Use `mexGetVariable` |
| `mexGetArrayPtr (Obsolete)` | Use `mexGetVariablePtr` |
| `mexGetEps (Obsolete)` | Use `mxGetEps` |
| `mexGetFull (Obsolete)` | Use `mexGetVariable`, `mxGetM, mxGetN`, `mxGetPr`, `mxGetPi` |
| `mexGetGlobal (Obsolete)` | Use `mexGetVariablePtr` |
| `mexGetInf (Obsolete)` | Use `mxGetInf` |
| `mexGetMatrix (Obsolete)` | Use `mexGetVariable` |
| `mexGetMatrixPtr (Obsolete)` | Use `mexGetVariablePtr` |
| `mexGetNaN (Obsolete)` | Use `mxGetNaN` |
| `mexGetVariable` | Get copy of variable from another workspace |
| `mexGetVariablePtr` | Get read-only pointer to variable from another workspace |
| `mexIsFinite (Obsolete)` | Use `mxIsFinite` |
| `mexIsGlobal` | Determine if `mxArray` has global scope |
| `mexIsInf (Obsolete)` | Use `mxIsInf` |
| `mexIsLocked` | Determine if MEX-file is locked |
| `mexIsNaN (Obsolete)` | Use `mxIsNaN` |

| | |
|---|---|
| `mexLock` | Prevent MEX-file from being cleared from memory |
| `mexMakeArrayPersistent` | Make `mxArray` persist after MEX-file completes |
| `mexMakeMemoryPersistent` | Make allocated memory persist after MEX-file completes |
| `mexPrintf` | ANSI C `printf`-style output routine |
| `mexPutArray (Obsolete)` | Use `mexPutVariable` |
| `mexPutFull (Obsolete)` | Use `mxCreateDoubleMatrix`, `mxSetPr`, `mxSetPi`, `mexPutVariable` |
| `mexPutMatrix (Obsolete)` | Use `mexPutVariable` |
| `mexPutVariable` | Copy `mxArray` from MEX-file to another workspace |
| `mexSet` | Set value of Handle Graphics property |
| `mexSetTrapFlag` | Control response of `mexCallMATLAB` to errors |
| `mexUnlock` | Allow MEX-file to be cleared from memory |
| `mexWarnMsgIdAndTxt` | Issue warning message with identifier |
| `mexWarnMsgTxt` | Issue warning message |

**Compatibility** This API function is obsolete and should not be used in any MATLAB program. This function will not be available in a future version of MATLAB.

# mexAtExit

**Purpose**

Register function to be called when MEX-function cleared or MATLAB terminates

**C Syntax**

```
#include "mex.h"
int mexAtExit(void (*ExitFcn)(void));
```

**Arguments**

`ExitFcn`
Pointer to function you want to run on exit.

**Returns**

Always returns 0.

**Description**

Use `mexAtExit` to register a C function to be called just before the MEX-function is cleared or MATLAB is terminated. `mexAtExit` gives your MEX-function a chance to perform tasks such as freeing persistent memory and closing files. Typically, the named `ExitFcn` performs tasks like closing streams or sockets.

Each MEX-function can register only one active exit function at a time. If you call `mexAtExit` more than once, MATLAB uses the `ExitFcn` from the more recent `mexAtExit` call as the exit function.

If a MEX-function is locked, all attempts to clear the MEX-file will fail. Consequently, if a user attempts to clear a locked MEX-file, MATLAB does not call the `ExitFcn`.

**Examples**

See `mexatexit.c` in the `mex` subdirectory of the `examples` directory.

**See Also**

`mexLock`, `mexUnlock`

**Purpose**

Call MATLAB function or user-defined M-file or MEX-file

**C Syntax**

```
#include "mex.h"
int mexCallMATLAB(int nlhs, mxArray *plhs[], int nrhs,
    mxArray *prhs[], const char *command_name);
```

**Arguments**

`nlhs`
Number of desired output arguments. This value must be less than or equal to 50.

`plhs`
Pointer to an array of `mxArrays`. The called command puts pointers to the resultant `mxArrays` into `plhs`. Note that the called command allocates dynamic memory to store the resultant `mxArrays`. By default, MATLAB automatically deallocates this dynamic memory when you clear the MEX-file. However, if heap space is at a premium, you may want to call `mxDestroyArray` as soon as you are finished with the `mxArrays` that `plhs` points to.

`nrhs`
Number of input arguments. This value must be less than or equal to 50.

`prhs`
Pointer to an array of input arguments.

`command_name`
Character string containing the name of the MATLAB built-in, operator, M-file, or MEX-file that you are calling. If `command_name` is an operator, just place the operator inside a pair of single quotes; for example, `'+'`.

**Returns**

0 if successful, and a nonzero value if unsuccessful.

**Description**

Call `mexCallMATLAB` to invoke internal MATLAB numeric functions, MATLAB operators, M-files, or other MEX-files. See `mexFunction` for a complete description of the arguments.

By default, if `command_name` detects an error, MATLAB terminates the MEX-file and returns control to the MATLAB prompt. If you want a different error behavior, turn on the trap flag by calling `mexSetTrapFlag`.

Note that it is possible to generate an object of type mxUNKNOWN_CLASS using mexCallMATLAB. For example, if you create an M-file that returns two variables but only assigns one of them a value,

```
function [a,b]=foo(c)
a=2*c;
```

you get this warning message in MATLAB:

```
Warning: One or more output arguments not assigned during call to
'foo'.
```

MATLAB assigns output b to an empty matrix. If you then call foo using mexCallMATLAB, the unassigned output variable is given type mxUNKNOWN_CLASS.

## Examples

See mexcallmatlab.c in the mex subdirectory of the examples directory.

For additional examples, see sincall.c in the refbook subdirectory of the examples directory; see mexevalstring.c and mexsettrapflag.c in the mex subdirectory of the examples directory; see mxcreatecellmatrix.c and mxisclass.c in the mx subdirectory of the examples directory.

## See Also

mexFunction, mexSetTrapFlag

## Purpose

Issue error message with identifier and return to MATLAB prompt

## C Syntax

```
#include "mex.h"
void mexErrMsgIdAndTxt(const char *identifier,
  const char *error_msg, ...);
```

## Arguments

`identifier`
String containing a MATLAB message identifier. See "Message Identifiers" in the MATLAB documentation for information on this topic.

`error_msg`
String containing the error message to be displayed. The string may include formatting conversion characters, such as those used with the ANSI C `sprintf` function.

`...`
Any additional arguments needed to translate formatting conversion characters used in `error_msg`. Each conversion character in `error_msg` is converted to one of these values.

## Description

Call `mexErrMsgIdAndTxt` to write an error message and its corresponding identifier to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgIdAndTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgIdAndTxt` does not invoke the function registered through `mexAtExit`.

If your application called `mxCalloc` or one of the `mxCreate` routines to allocate memory, `mexErrMsgIdAndTxt` automatically frees the allocated memory.

---

**Note** If you get warnings when using `mexErrMsgIdAndTxt`, you may have a memory management compatibility problem. For more information, see "Memory Management Compatibility Issues" in the External Interfaces documentation.

---

## See Also

`mexErrMsgTxt`, `mexWarnMsgIdAndTxt`, `mexWarnMsgTxt`

# mexErrMsgTxt

**Purpose** Issue error message and return to MATLAB prompt

**C Syntax**

```
#include "mex.h"
void mexErrMsgTxt(const char *error_msg);
```

**Arguments**

`error_msg`
String containing the error message to be displayed.

**Description**

Call `mexErrMsgTxt` to write an error message to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgTxt` does not invoke the function registered through `mexAtExit`.

If your application called `mxCalloc` or one of the `mxCreate` routines to allocate memory, `mexErrMsgTxt` automatically frees the allocated memory.

---

**Note** If you get warnings when using `mexErrMsgTxt`, you may have a memory management compatibility problem. For more information, see Memory Management Compatibility Issues.

---

**Examples**

See `xtimesy.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `convec.c`, `findnz.c`, `fulltosparse.c`, `phonebook.c`, `revord.c`, and `timestwo.c` in the `refbook` subdirectory of the `examples` directory.

**See Also**

`mexErrMsgIdAndTxt`, `mexWarnMsgTxt`, `mexWarnMsgIdAndTxt`

**Purpose**

Execute MATLAB command in workspace of caller

**C Syntax**

```
#include "mex.h"
int mexEvalString(const char *command);
```

**Arguments**

`command`
A string containing the MATLAB command to execute.

**Returns**

0 if successful, and a nonzero value if unsuccessful.

**Description**

Call `mexEvalString` to invoke a MATLAB `command` in the workspace of the caller.

`mexEvalString` and `mexCallMATLAB` both execute MATLAB commands. However, `mexCallMATLAB` provides a mechanism for returning results (left-hand side arguments) back to the MEX-file; `mexEvalString` provides no way for return values to be passed back to the MEX-file.

All arguments that appear to the right of an equals sign in the `command` string must already be current variables of the caller's workspace.

**Examples**

See `mexevalstring.c` in the `mex` subdirectory of the `examples` directory.

**See Also**

`mexCallMATLAB`

# mexFunction

**Purpose**

Entry point to C MEX-file

**C Syntax**

```
#include "mex.h"
void mexFunction(int nlhs, mxArray *plhs[], int nrhs,
     const mxArray *prhs[]);
```

**Arguments**

`nlhs`
MATLAB sets `nlhs` with the number of expected `mxArrays`.

`plhs`
MATLAB sets `plhs` to a pointer to an array of NULL pointers.

`nrhs`
MATLAB sets `nrhs` to the number of input `mxArrays`.

`prhs`
MATLAB sets `prhs` to a pointer to an array of input `mxArrays`. `These mxArrays` are declared as `constant`; they are read only and should not be modified by your MEX-file. Changing the data in these `mxArrays` may produce undesired side effects.

**Description**

`mexFunction` is not a routine you call. Rather, `mexFunction` is the generic name of the function entry point that must exist in every C source MEX-file. When you invoke a MEX-function, MATLAB finds and loads the corresponding MEX-file of the same name. MATLAB then searches for a symbol named `mexFunction` within the MEX-file. If it finds one, it calls the MEX-function using the address of the `mexFunction` symbol. If MATLAB cannot find a routine named `mexFunction` inside the MEX-file, it issues an error message.

When you invoke a MEX-file, MATLAB automatically seeds `nlhs`, `plhs`, `nrhs`, and `prhs` with the caller's information. In the syntax of the MATLAB language, functions have the general form

```
[a,b,c,...] = fun(d,e,f,...)
```

where the denotes more items of the same format. The `a,b,c...` are left-hand side arguments and the `d,e,f...` are right-hand side arguments. The arguments `nlhs` and `nrhs` contain the number of left-hand side and right-hand side arguments, respectively, with which the MEX-function is called. `prhs` is a pointer to a length `nrhs` array of pointers to the right-hand side `mxArrays`. `plhs` is a pointer to a length `nlhs` array where your C function must put pointers for the returned left-hand side `mxArrays`.

**Examples** See `mexfunction.c` in the `mex` subdirectory of the `examples` directory.

# mexFunctionName

**Purpose** Gives name of current MEX-function

**C Syntax**

```
#include "mex.h"
const char *mexFunctionName(void);
```

**Arguments** `none`

**Returns** The name of the current MEX-function.

**Description** `mexFunctionName` returns the name of the current MEX-function.

**Examples** See `mexgetarray.c` in the `mex` subdirectory of the `examples` directory.

## Purpose

Get value of specified Handle Graphics® property

## C Syntax

```
#include "mex.h"
const mxArray *mexGet(double handle, const char *property);
```

## Arguments

`handle`
Handle to a particular graphics object.

`property`
A Handle Graphics property.

## Returns

The value of the specified property in the specified graphics object on success. Returns `NULL` on failure. The return argument from `mexGet` is declared as `constant`, meaning that it is read only and should not be modified. Changing the data in these `mxArrays` may produce undesired side effects.

## Description

Call `mexGet` to get the value of the property of a certain graphics object. `mexGet` is the API equivalent of the MATLAB `get` function. To set a graphics property value, call `mexSet`.

## Examples

See `mexget.c` in the `mex` subdirectory of the `examples` directory.

## See Also

`mexSet`

# mexGetArray (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mexGetVariable(workspace, var_name);
```

instead of

```
mexGetArray(var_name, workspace);
```

**See Also**

`mexGetVariable`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mexGetVariablePtr(workspace, var_name);
```

instead of

```
mexGetArrayPtr(var_name, workspace);
```

**See Also**

`mexGetVariable`

# mexGetEps (Obsolete)

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
eps = mxGetEps();
```

instead of

```
eps = mexGetEps();
```

**See Also** `mxGetEps`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
array_ptr = mexGetVariable("caller", name);
m = mxGetM(array_ptr);
n = mxGetN(array_ptr);
pr = mxGetPr(array_ptr);
pi = mxGetPi(array_ptr);
```

instead of

```
mexGetFull(name, m, n, pr, pi);
```

**See Also**

`mexGetVariable`, `mxGetPr`, `mxGetPi`

# mexGetGlobal (Obsolete)

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexGetVariablePtr("global", name);
```

instead of

```
mexGetGlobal(name);
```

**See Also** `mexGetVariable`, `mxGetName (Obsolete)`, `mxGetPr`, `mxGetPi`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
inf = mxGetInf();
```

instead of

```
inf = mexGetInf();
```

**See Also**

`mxGetInf`

# mexGetMatrix (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexGetVariable("caller", name);
```

instead of

```
mexGetMatrix(name);
```

**See Also**

`mexGetVariable`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexGetVariablePtr("caller", name);
```

instead of

```
mexGetMatrixPtr(name);
```

**See Also**

`mexGetVariablePtr`

# mexGetNaN (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
NaN = mxGetNaN();
```

instead of

```
NaN = mexGetNaN();
```

**See Also**

`mxGetNaN`

**Purpose**

Get copy of variable from specified workspace

**C Syntax**

```
#include "mex.h"
mxArray *mexGetVariable(const char *workspace, const char
   *var_name);
```

**Arguments**

*workspace*
Specifies where mexGetVariable should search in order to find array, var_name. The possible values are

| | |
|---|---|
| base | Search for the variable in the base workspace |
| caller | Search for the variable in the caller's workspace |
| global | Search for the variable in the global workspace |

var_name
Name of the variable to copy.

**Returns**

A copy of the variable on success. Returns NULL on failure. A common cause of failure is specifying a variable that is not currently in the workspace. Perhaps the variable was in the workspace at one time but has since been cleared.

**Description**

Call mexGetVariable to get a copy of the specified variable. The returned mxArray contains a copy of all the data and characteristics that the variable had in the other workspace. Modifications to the returned mxArray do not affect the variable in the workspace unless you write the copy back to the workspace with mexPutVariable.

**Examples**

See mexgetarray.c in the mex subdirectory of the examples directory.

**See Also**

mexGetVariablePtr, mexPutVariable

# mexGetVariablePtr

**Purpose** Get read-only pointer to variable from another workspace

**C Syntax**

```
#include "mex.h"
const mxArray *mexGetVariablePtr(const char *workspace,
  const char *var_name);
```

**Arguments**

`workspace`
Specifies which workspace you want `mexGetVariablePtr` to search. The possible values are:

| | |
|---|---|
| `base` | Search for the variable in the base workspace |
| `caller` | Search for the variable in the caller's workspace |
| `global` | Search for the variable in the global workspace |

`var_name`
Name of a variable in another workspace. (Note that this is a variable name, not an `mxArray` pointer.)

**Returns** A read-only pointer to the `mxArray` on success. Returns `NULL` on failure.

**Description** Call `mexGetVariablePtr` to get a read-only pointer to the specified variable, `var_name`, into your MEX-file's workspace. This command is useful for examining an `mxArray's` data and characteristics. If you need to change data or characteristics, use `mexGetVariable` (along with `mexPutVariable`) instead of `mexGetVariablePtr`.

If you simply need to examine data or characteristics, `mexGetVariablePtr` offers superior performance as the caller need pass only a pointer to the array.

**Examples** See `mxislogical.c` in the `mx` subdirectory of the `examples` directory.

**See Also** `mexGetVariable`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
answer = mxIsFinite(value);
```

instead of

```
answer = mexIsFinite(value);
```

**See Also**

`mxIsFinite`

# mexIsGlobal

**Purpose**

Determine if `mxArray` has global scope

**C Syntax**

```
#include "matrix.h"
bool mexIsGlobal(const mxArray *array_ptr);
```

**Arguments**

`array_ptr`
Pointer to an `mxArray`.

**Returns**

Logical `1` (`true`) if the `mxArray` has global scope, and logical `0` (`false`) otherwise.

**Description**

Use `mexIsGlobal` to determine if the specified `mxArray` has global scope.

**Examples**

See `mxislogical.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mexGetVariable`, `mexGetVariablePtr`, `mexPutVariable`, `global`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
answer = mxIsInf(value);
```

instead of

```
answer = mexIsInf(value);
```

**See Also**

`mxIsInf`

# mexIsLocked

**Purpose** Determine if MEX-file is locked

**C Syntax**

```
#include "mex.h"
bool mexIsLocked(void);
```

**Returns** Logical `1` (`true`) if the MEX-file is locked; logical `0` (`false`) if the file is unlocked.

**Description** Call `mexIsLocked` to determine if the MEX-file is locked. By default, MEX-files are unlocked, meaning that users can clear the MEX-file at any time.

To unlock a MEX-file, call `mexUnlock`.

**Examples** See `mexlock.c` in the `mex` subdirectory of the `examples` directory.

**See Also** `mexLock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mexUnlock`

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
answer = mxIsNaN(value);
```

instead of

```
answer = mexIsNaN(value);
```

## See Also

`mxIsInf`

# mexLock

**Purpose** Prevent MEX-file from being cleared from memory

**C Syntax**

```
#include "mex.h"
void mexLock(void);
```

**Description** By default, MEX-files are unlocked, meaning that a user can clear them at any time. Call `mexLock` to prohibit a MEX-file from being cleared.

To unlock a MEX-file, call `mexUnlock`.

`mexLock` increments a lock count. If you call `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

**Examples** See `mexlock.c` in the `mex` subdirectory of the `examples` directory.

**See Also** `mexIsLocked`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mexUnlock`

# mexMakeArrayPersistent

**Purpose**

Make mxArray persist after MEX-file completes

**C Syntax**

```
#include "mex.h"
void mexMakeArrayPersistent(mxArray *array_ptr);
```

**Arguments**

array_ptr
Pointer to an mxArray created by an mxCreate* routine.

**Description**

By default, mxArrays allocated by mxCreate* routines are not persistent. The MATLAB memory management facility automatically frees nonpersistent mxArrays when the MEX-function finishes. If you want the mxArray to persist through multiple invocations of the MEX-function, you must call mexMakeArrayPersistent.

---

**Note** If you create a persistent mxArray, you are responsible for destroying it when the MEX-file is cleared. If you do not destroy a persistent mxArray, MATLAB will leak memory. See mexAtExit to see how to register a function that gets called when the MEX-file is cleared. See mexLock to see how to lock your MEX-file so that it is never cleared.

---

**See Also**

mexAtExit, mexLock, mexMakeMemoryPersistent, and the mxCreate functions.

# mexMakeMemoryPersistent

**Purpose** Make allocated memory MATLAB persist after MEX-function completes

**C Syntax**

```
#include "mex.h"
void mexMakeMemoryPersistent(void *ptr);
```

**Arguments**

`ptr`
Pointer to the beginning of memory allocated by one of the MATLAB memory allocation routines.

**Description** By default, memory allocated by MATLAB is nonpersistent, so it is freed automatically when the MEX-file finishes. If you want the memory to persist, you must call `mexMakeMemoryPersistent`.

---

**Note** If you create persistent memory, you are responsible for freeing it when the MEX-function is cleared. If you do not free the memory, MATLAB will leak memory. To free memory, use `mxFree`. See `mexAtExit` to see how to register a function that gets called when the MEX-function is cleared. See `mexLock` to see how to lock your MEX-function so that it is never cleared.

---

**See Also** `mexAtExit`, `mexLock`, `mexMakeArrayPersistent`, `mxCalloc`, `mxFree`, `mxMalloc`, `mxRealloc`

**Purpose**

ANSI C `printf`-style output routine

**C Syntax**

```
#include "mex.h"
int mexPrintf(const char *format, ...);
```

**Arguments**

`format, ...`
ANSI C `printf`-style format string and optional arguments.

**Returns**

The number of characters printed. This includes characters specified with backslash codes, such as `\n` and `\b`.

**Description**

This routine prints a string on the screen and in the diary (if the diary is in use). It provides a callback to the standard C `printf` routine already linked inside MATLAB, and avoids linking the entire `stdio` library into your MEX-file.

In a MEX-file, you must call `mexPrintf` instead of `printf`.

**Examples**

See `mexfunction.c` in the `mex` subdirectory of the `examples` directory. For an additional example, see `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

**See Also**

`mexErrMsgTxt`, `mexWarnMsgTxt`

# mexPutArray (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mexPutVariable(workspace, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
mexPutArray(array_ptr, workspace);
```

**See Also**

`mexPutVariable`

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
array_ptr = mxCreateDoubleMatrix(m, n, mxREAL/mxCOMPLEX);
mxSetPr(array_ptr, pr);
mxSetPi(array_ptr, pi);
mexPutVariable("caller", name, array_ptr);
```

instead of

```
mexPutFull(name, m, n, pr, pi);
```

## See Also

`mxSetM`, `mxSetN`, `mxSetPr`, `mxSetPi`, `mexPutVariable`

# mexPutMatrix (Obsolete)

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexPutVariable("caller", var_name, array_ptr);
```

instead of

```
mexPutMatrix(matrix_ptr);
```

**See Also** `mexPutVariable`

## Purpose

Copy `mxArray` from MEX-function into specified workspace

## C Syntax

```
#include "mex.h"
int mexPutVariable(const char *workspace, const char *var_name,
  const mxArray *array_ptr);
```

## Arguments

*workspace*
Specifies the scope of the array that you are copying. The possible values are

| | |
|---|---|
| `base` | Copy `mxArray` to the base workspace |
| `caller` | Copy `mxArray` to the caller's workspace |
| `global` | Copy `mxArray` to the list of global variables |

`var_name`
Name given to the `mxArray` in the workspace.

`array_ptr`
Pointer to the `mxArray`.

## Returns

`0` on success; `1` on failure. A possible cause of failure is that `array_ptr` is `NULL`.

## Description

Call `mexPutVariable` to copy the `mxArray`, at pointer `array_ptr`, from your MEX-function into the specified workspace. MATLAB gives the name, `var_name`, to the copied `mxArray` in the receiving workspace.

`mexPutVariable` makes the array accessible to other entities, such as MATLAB, M-files or other MEX-functions.

If a variable of the same name already exists in the specified workspace, `mexPutVariable` overwrites the previous contents of the variable with the contents of the new `mxArray`. For example, suppose the MATLAB workspace defines variable `Peaches` as

```
Peaches
1     2     3     4
```

and you call `mexPutVariable` to copy `Peaches` into the same workspace:

```
mexPutVariable("base", "Peaches", array_ptr)
```

Then the old value of `Peaches` disappears and is replaced by the value passed in by `mexPutVariable`.

**Examples** See `mexgetarray.c` in the `mex` subdirectory of the `examples` directory.

**See Also** `mexGetVariable`

**Purpose** Set value of specified Handle Graphics property

**C Syntax**

```
#include "mex.h"
int mexSet(double handle, const char *property,
         mxArray *value);
```

**Arguments**

`handle`
Handle to a particular graphics object.

`property`
String naming a Handle Graphics property.

`value`
Pointer to an `mxArray` holding the new value to assign to the property.

**Returns** 0 on success; 1 on failure. Possible causes of failure include:

- Specifying a nonexistent property.
- Specifying an illegal value for that property. For example, specifying a string value for a numerical property.

**Description** Call `mexSet` to set the value of the property of a certain graphics object. `mexSet` is the API equivalent of the MATLAB `set` function. To get the value of a graphics property, call `mexGet`.

**Examples** See `mexget.c` in the `mex` subdirectory of the `examples` directory.

**See Also** `mexGet`

# mexSetTrapFlag

**Purpose**

Control response of `mexCallMATLAB` to errors

**C Syntax**

```
#include "mex.h"
void mexSetTrapFlag(int trap_flag);
```

**Arguments**

`trap_flag`
Control flag. Currently, the only legal values are:

| | |
|---|---|
| 0 | On error, control returns to the MATLAB prompt. |
| 1 | On error, control returns to your MEX-file. |

**Description**

Call `mexSetTrapFlag` to control the MATLAB response to errors in `mexCallMATLAB`.

If you do not call `mexSetTrapFlag`, then whenever MATLAB detects an error in a call to `mexCallMATLAB`, MATLAB automatically terminates the MEX-file and returns control to the MATLAB prompt. Calling `mexSetTrapFlag` with `trap_flag` set to 0 is equivalent to not calling `mexSetTrapFlag` at all.

If you call `mexSetTrapFlag` and set the `trap_flag` to 1, then whenever MATLAB detects an error in a call to `mexCallMATLAB`, MATLAB does not automatically terminate the MEX-file. Rather, MATLAB returns control to the line in the MEX-file immediately following the call to `mexCallMATLAB`. The MEX-file is then responsible for taking an appropriate response to the error.

If you call `mexSetTrapFlag`, the value of the `trap_flag` you set remains in effect until the next call to `mexSetTrapFlag` within that MEX-file or, if there are no more calls to `mexSetTrapFlag`, until the MEX-file exits. If a routine defined in a MEX-file calls another MEX-file:

1. The current value of the `trap_flag` in the first MEX-file is saved.
2. The second MEX-file is called with the `trap_flag` initialized to 0 within that file.
3. When the second MEX-file exits, the saved value of the `trap_flag` in the first MEX-file is restored within that file.

**Examples**

See `mexsettrapflag.c` in the `mex` subdirectory of the `examples` directory.

**See Also**

`mexAtExit`, `mexErrMsgTxt`

**Purpose** Allow MEX-file to be cleared from memory

**C Syntax**

```
#include "mex.h"
void mexUnlock(void);
```

**Description** By default, MEX-files are unlocked, meaning that a user can clear them at any time. Calling `mexLock` locks a MEX-file so that it cannot be cleared. Calling `mexUnlock` removes the lock so that the MEX-file can be cleared.

`mexLock` increments a lock count. If you called `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

**Examples** See `mexlock.c` in the `mex` subdirectory of the `examples` directory.

**See Also** `mexIsLocked`, `mexLock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

# mexWarnMsgIdAndTxt

**Purpose**

Issue warning message with identifier

**C Syntax**

```
#include "mex.h"
void mexWarnMsgIdAndTxt(const char *identifier,
  const char *warning_msg, ...);
```

**Arguments**

`identifier`
String containing a MATLAB message identifier. See "Message Identifiers" in the MATLAB documentation for information on this topic.

`warning_msg`
String containing the warning message to be displayed. The string may include formatting conversion characters, such as those used with the ANSI C `sprintf` function.

`...`
Any additional arguments needed to translate formatting conversion characters used in `warning_msg`. Each conversion character in `warning_msg` is converted to one of these values.

**Description**

Call `mexWarnMsgIdAndTxt` to write a warning message and its corresponding identifier to the MATLAB window.

Unlike `mexErrMsgIdAndTxt`, `mexWarnMsgIdAndTxt` does not cause the MEX-file to terminate.

**See Also**

`mexWarnMsgTxt`, `mexErrMsgIdAndTxt`, `mexErrMsgTxt`

# mexWarnMsgTxt

**Purpose**

Issue warning message

**C Syntax**

```
#include "mex.h"
void mexWarnMsgTxt(const char *warning_msg);
```

**Arguments**

`warning_msg`
String containing the warning message to be displayed.

**Description**

`mexWarnMsgTxt` causes MATLAB to display the contents of `warning_msg`.

Unlike `mexErrMsgTxt`, `mexWarnMsgTxt` does not cause the MEX-file to terminate.

**Examples**

See `yprime.c` in the `mex` subdirectory of the `examples` directory.

For additional examples, see `explore.c` in the `mex` subdirectory of the `examples` directory; see `fulltosparse.c` and `revord.c` in the `refbook` subdirectory of the `examples` directory; see `mxisfinite.c` and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

**See Also**

`mexWarnMsgIdAndTxt`, `mexErrMsgTxt`, `mexErrMsgIdAndTxt`

# MATLAB Engine (C)

| | |
|---|---|
| `engClose` | Quit MATLAB engine session |
| `engEvalString` | Evaluate expression in string |
| `engGetArray (Obsolete)` | Use `engGetVariable` |
| `engGetFull (Obsolete)` | Use `engGetVariable` followed by appropriate `mxGet` routines |
| `engGetMatrix (Obsolete)` | Use `engGetVariable` |
| `engGetVariable` | Copy variable from engine workspace |
| `engGetVisible` | Determine visibility of engine session |
| `engOpen` | Start MATLAB engine session |
| `engOpenSingleUse` | Start MATLAB engine session for single, nonshared use |
| `engOutputBuffer` | Specify buffer for MATLAB output |
| `engPutArray (Obsolete)` | Use `engPutVariable` |
| `engPutFull (Obsolete)` | Use `mxCreateDoubleMatrix` and `engPutVariable` |
| `engPutMatrix (Obsolete)` | Use `engPutVariable` |
| `engPutVariable` | Put variables into engine workspace |
| `engSetEvalCallback (Obsolete)` | Function is obsolete |
| `engSetEvalTimeout (Obsolete)` | Function is obsolete |
| `engSetVisible` | Show or hide engine session |
| `engWinInit (Obsolete)` | Function is obsolete |

# engClose

**Purpose** Quit MATLAB engine session

**C Syntax**

```
#include "engine.h"
int engClose(Engine *ep);
```

**Arguments**

`ep`
Engine pointer.

**Description**

This routine allows you to quit a MATLAB engine session.

`engClose` sends a quit command to the MATLAB engine session and closes the connection. It returns 0 on success, and 1 otherwise. Possible failure includes attempting to terminate a MATLAB engine session that was already terminated.

**Examples**

### UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

### Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

**Purpose** Evaluate expression in string

**C Syntax**

```
#include "engine.h"
int engEvalString(Engine *ep, const char *string);
```

**Arguments**

`ep`
Engine pointer.

`string`
String to execute.

**Description**

`engEvalString` evaluates the expression contained in `string` for the MATLAB engine session, `ep`, previously started by `engOpen`. It returns a nonzero value if the MATLAB session is no longer running, and zero otherwise.

On UNIX systems, `engEvalString` sends commands to MATLAB by writing down a pipe connected to the MATLAB *stdin*. Any output resulting from the command that ordinarily appears on the screen is read back from *stdout* into the buffer defined by `engOutputBuffer`. To turn off output buffering, use

```
engOutputBuffer(ep, NULL, 0);
```

Under Windows on a PC, `engEvalString` communicates with MATLAB using a Component Object Model (COM) interface.

**Examples**

### UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

### Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

# engGetArray (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
array_ptr = engGetVariable(ep, var_name);
```

instead of

```
array_ptr = engGetArray(ep, var_name);
```

**See Also**

`engGetVariable`, `engPutVariable`, and examples in the `eng_mat` subdirectory of the `examples` directory

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`engGetVariable` followed by appropriate `mxGet` routines (`mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`)

instead of

`engGetFull`

For example,

```
int engGetFull(
   Engine      *ep,    /* engine pointer */
   char        *name,  /* full array name */
   int         *m,     /* returned number of rows */
   int         *n,     /* returned number of columns */
   double      **pr,   /* returned pointer to real part */
   double      **pi    /* returned pointer to imaginary part */
   )
{
   mxArray     *pmat;

   pmat = engGetVariable(ep, name);

   if (!pmat)
           return(1);

   if (!mxIsDouble(pmat)) {
           mxDestroyArray(pmat);
           return(1);
   }

   *m  = mxGetM(pmat);
   *n  = mxGetN(pmat);
   *pr = mxGetPr(pmat);
   *pi = mxGetPi(pmat);
```

```
    /* Set pr & pi in array struct to NULL so it can be cleared. */
    mxSetPr(pmat, NULL);
    mxSetPi(pmat, NULL);

    mxDestroyArray(pmat);

    return(0);
}
```

**See Also**

engGetVariable and examples in the eng_mat subdirectory of the examples directory

## Compatibility

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
array_ptr = engGetVariable(ep, var_name);
```

instead of

```
array_ptr = engGetMatrix(ep, var_name);
```

## See Also

`engGetVariable`, `engPutVariable`, and examples in the `eng_mat` subdirectory of the `examples` directory

# engGetVariable

**Purpose**

Copy variable from MATLAB engine workspace

**C Syntax**

```
#include "engine.h"
mxArray *engGetVariable(Engine *ep, const char *var_name);
```

**Arguments**

`ep`
Engine pointer.

`var_name`
Name of `mxArray` to get from MATLAB.

**Description**

`engGetVariable` reads the named `mxArray` from the MATLAB engine session associated with `ep` and returns a pointer to a newly allocated `mxArray` structure, or `NULL` if the attempt fails. `engGetVariable` fails if the named variable does not exist.

Be careful in your code to free the `mxArray` created by this routine when you are finished with it.

**Examples**

### UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

### Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

**See Also**

`engPutVariable`

**Purpose**

Determine visibility of MATLAB engine session

**C Syntax**

```
#include "engine.h"
int engGetVisible(Engine *ep, bool *value);
```

**Arguments**

`ep`
Engine pointer.

`value`
Pointer to value returned from `engGetVisible`.

**Description**

### Windows Only

`engGetVisible` returns the current visibility setting for MATLAB engine session, `ep`. A *visible* engine session runs in a window on the Windows desktop, thus making the engine available for user interaction. An invisible session is hidden from the user by removing it from the desktop.

`engGetVisible` returns 0 on success, and 1 otherwise.

**Examples**

The following code opens engine session `ep` and disables its visibility.

```
Engine *ep;
bool vis;

ep = engOpen(NULL);
engSetVisible(ep, 0);
```

To determine the current visibility setting, use

```
engGetVisible(ep, &vis);
```

**See Also**

`engSetVisible`

**Purpose** Start MATLAB engine session

**C Syntax**

```
#include "engine.h"
Engine *engOpen(const char *startcmd);
```

**Arguments**

`startcmd`
String to start MATLAB process. On Windows, the `startcmd` string must be `NULL`.

**Returns** A pointer to an engine handle.

**Description**

This routine allows you to start a MATLAB process for the purpose of using MATLAB as a computational engine.

`engOpen(startcmd)` starts a MATLAB process using the command specified in the string `startcmd`, establishes a connection, and returns a unique engine identifier, or `NULL` if the open fails.

On UNIX systems, if `startcmd` is `NULL` or the empty string, `engOpen` starts MATLAB on the current host using the command `matlab`. If `startcmd` is a hostname, `engOpen` starts MATLAB on the designated host by embedding the specified hostname string into the larger string:

```
"rsh hostname \"/bin/csh -c 'setenv DISPLAY\
   hostname:0; matlab'\""
```

If `startcmd` is any other string (has white space in it, or nonalphanumeric characters), the string is executed literally to start MATLAB.

On UNIX systems, `engOpen` performs the following steps:

1. Creates two pipes.
2. Forks a new process and sets up the pipes to pass *stdin* and *stdout* from MATLAB (parent) to two file descriptors in the engine program (child).
3. Executes a command to run MATLAB (`rsh` for remote execution).

Under Windows on a PC, engOpen opens a COM channel to MATLAB. This starts the MATLAB that was registered during installation. If you did not register during installation, on the command line you can enter the command:

```
matlab /regserver
```

See "Introducing MATLAB COM Integration" for additional details.

## Examples

### UNIX

See engdemo.c in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

### Windows

See engwindemo.c in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

# engOpenSingleUse

**Purpose**

Start MATLAB engine session for single, nonshared use

**C Syntax**

```
#include "engine.h"
Engine *engOpenSingleUse(const char *startcmd, void *dcom,
   int *retstatus);
```

**Arguments**

`startcmd`
String to start MATLAB process. On Windows, the `startcmd` string must be `NULL`.

`dcom`
Reserved for future use; must be `NULL`.

`retstatus`
Return status; possible cause of failure.

**Description**

### Windows

This routine allows you to start multiple MATLAB processes for the purpose of using MATLAB as a computational engine. `engOpenSingleUse` starts a MATLAB process, establishes a connection, and returns a unique engine identifier, or `NULL` if the open fails. `engOpenSingleUse` starts a new MATLAB process each time it is called.

`engOpenSingleUse` opens a COM channel to MATLAB. This starts the MATLAB that was registered during installation. If you did not register during installation, on the command line you can enter the command:

```
matlab /regserver
```

`engOpenSingleUse` allows single-use instances of a MATLAB engine server. `engOpenSingleUse` differs from `engOpen`, which allows multiple users to use the same MATLAB engine server.

See Introducing MATLAB COM Integration for additional details.

### UNIX

This routine is not supported and simply returns.

**Purpose**

Specify buffer for MATLAB output

**C Syntax**

```
#include "engine.h"
int engOutputBuffer(Engine *ep, char *p, int n);
```

**Arguments**

`ep`
Engine pointer.

`p`
Pointer to character buffer of length `n`.

`n`
Length of buffer `p`.

**Description**

`engOutputBuffer` defines a character buffer for `engEvalString` to return any output that ordinarily appears on the screen.

The default behavior of `engEvalString` is to discard any standard output caused by the command it is executing. `engOutputBuffer(ep, p, n)` tells any subsequent calls to `engEvalString` to save the first `n` characters of output in the character buffer pointed to by `p`.

To turn off output buffering, use `engOutputBuffer(ep, NULL, 0);`

---

**Note** The buffer returned by `engEvalString` is not guaranteed to be `NULL` terminated.

---

**Examples**

### UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

### Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

# engPutArray (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
engPutVariable(ep, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
engPutArray(ep, array_ptr);
```

**See Also**

`engPutVariable`, `engGetVariable`, and examples in the `eng_mat` subdirectory of the `examples` directory

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`mxCreateDoubleMatrix` and `engPutVariable`

instead of

`engPutFull`

For example,

```
int engPutFull(
   Engine      *ep,        /* engine pointer */
   char        *name,      /* full array name */
   int         m,          /* number of rows */
   int         n,          /* number of columns */
   double      *pr,        /* pointer to real part */
   double      *pi         /* pointer to imaginary part */
   )
{
   mxArray     *pmat;
   int         retval;

   pmat = mxCreateDoubleMatrix(0, 0, mxCOMPLEX);

   mxSetM(pmat, m);
   mxSetN(pmat, n);
   mxSetPr(pmat, pr);
   mxSetPi(pmat, pi);

   retval = engPutVariable(ep, name, pmat);

   /* Set pr & pi in array struct to NULL so it can be cleared. */
   mxSetPr(pmat, NULL);
   mxSetPi(pmat, NULL);

   mxDestroyArray(pmat);

   return(retval);
}
```

**See Also** `engGetVariable`, `mxCreateDoubleMatrix`

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
engPutVariable(ep, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
engPutMatrix(ep, array_ptr);
```

**See Also**

engPutVariable

# engPutVariable

**Purpose** Put variables into MATLAB engine workspace

**C Syntax**

```
#include "engine.h"
int engPutVariable(Engine *ep, const char *var_name, const mxArray
   *array_ptr);
```

**Arguments**

`ep`
Engine pointer.

`var_name`
Name given to the `mxArray` in the engine's workspace.

`array_ptr`
`mxArray` pointer.

**Description**

`engPutVariable` writes `mxArray` `array_ptr` to the engine `ep`, giving it the variable name, `var_name`. If the `mxArray` does not exist in the workspace, it is created. If an `mxArray` with the same name already exists in the workspace, the existing `mxArray` is replaced with the new `mxArray`.

`engPutVariable` returns `0` if successful and `1` if an error occurs.

**Examples**

### UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

### Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

# engSetEvalTimeout (Obsolete)

**Compatibility** This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

**Purpose**

Show or hide MATLAB engine session

**C Syntax**

```
#include "engine.h"
int engSetVisible(Engine *ep, bool value);
```

**Arguments**

`ep`
Engine pointer.

`value`
Value to set the Visible property to. Set `value` to `1` to make the engine window visible, or to `0` to make it invisible.

**Description**

### Windows Only

`engSetVisible` makes the window for the MATLAB engine session, `ep`, either visible or invisible on the Windows desktop. You can use this function to enable or disable user interaction with the MATLAB engine session.

`engSetVisible` returns 0 on success, and 1 otherwise.

**Examples**

The following code opens engine session `ep` and disables its visibility.

```
Engine *ep;
bool vis;

ep = engOpen(NULL);
engSetVisible(ep, 0);
```

To determine the current visibility setting, use

```
engGetVisible(ep, &vis);
```

**See Also**

`engGetVisible`

# engWinInit (Obsolete)

**Compatibility**

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later. This function is not necessary in MATLAB 5 or later engine programs.

# MAT-File Access (Fortran)

**Purpose**

Close MAT-file

**Fortran Syntax**

```
integer*4 function matClose(mfp)
integer*4 mfp
```

**Arguments**

`mfp`
Pointer to MAT-file information.

**Description**

`matClose` closes the MAT-file associated with `mfp`. It returns -1 for a write error, and 0 if successful.

**Examples**

See `matdemo1.f` and `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use this MAT-file routine in a Fortran program.

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matDeleteVariable` instead.

**See Also**

`matDeleteVariable`

# matDeleteMatrix (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matDeleteVariable` instead.

**See Also** `matDeleteVariable`

**Purpose**

Delete named mxArray from MAT-file

**Fortran Syntax**

```
integer*4 function matDeleteVariable(mfp, name)
integer*4 mfp
character*(*) name
```

**Arguments**

mfp
Pointer to MAT-file information.

name
Name of mxArray to delete.

**Description**

matDeleteVariable deletes the named mxArray from the MAT-file pointed to by mfp. The function returns 0 if successful, and nonzero otherwise.

# matGetArray (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matGetVariable` instead.

**See Also** `matGetVariable`

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matGetVariableInfo` instead.

**See Also** `matGetVariableInfo`

# matGetDir

**Purpose** Get directory of mxArrays from MAT-file

**Fortran Syntax**

```
integer*4 function matGetDir(mfp, num)
integer*4 mfp, num
```

**Arguments**

mfp
Pointer to MAT-file information.

num
Address of the variable to contain the number of mxArrays in the MAT-file.

**Description** This routine enables you to get a list of the names of the mxArrays contained within a MAT-file.

matGetDir returns a pointer to an internal array containing pointers to the names of the mxArrays in the MAT-file pointed to by mfp. The length of the internal array (number of mxArrays in the MAT-file) is placed into num. The internal array is allocated using a single mxCalloc. Use mxFree to free the array when you are finished with it.

matGetDir returns 0 and sets num to a negative number if it fails. If num is zero, mfp contains no mxArrays.

MATLAB variable names can be up to length 32.

**Examples** See matdemo2.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this MAT-file routine in a Fortran program.

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = matGetVariable(mfp, name)
m  = mxGetM(pm)
n  = mxGetN(pm)
pr = mxGetPr(pm)
pi = mxGetPi(pm)

mxDestroyArray(pm)
```

instead of

```
matGetFull(mfp, name, m, n, pr, pi)
```

**See Also**

`matGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`, `mxDestroyArray`

# matGetMatrix (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matGetVariable` instead.

**See Also** `matGetVariable`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matGetNextVariable` instead.

**See Also**

`matGetNextVariable`

# matGetNextArrayHeader (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matGetNextVariableInfo` instead.

**See Also** `matGetNextVariableInfo`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matGetNextVariable` instead.

**See Also**

`matGetNextVariable`

# matGetNextVariable

**Purpose**

Read next mxArray from MAT-file

**Fortran Syntax**

```
integer*4 function matGetNextVariable(mfp, name)
integer*4 mfp
character*(*) name
```

**Arguments**

mfp
Pointer to MAT-file information.

name
Address of the variable to contain the mxArray name.

**Description**

matGetNextVariable allows you to step sequentially through a MAT-file and read all the mxArrays in a single pass. The function reads the next mxArray from the MAT-file pointed to by mfp and returns a pointer to a newly allocated mxArray structure. MATLAB returns the name of the mxArray in name.

Use matGetNextVariable immediately after opening the MAT-file with matOpen and not in conjunction with other MAT-file routines. Otherwise, the concept of the *next* mxArray is undefined.

matGetNextVariable returns 0 when the end-of-file is reached or if there is an error condition.

Be careful in your code to free the mxArray created by this routine when you are finished with it.

**Purpose** Load array header information only

**Fortran Syntax**

```
integer*4 function matGetNextVariableInfo(mfp, name)
integer*4 mfp
character*(*) name
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Address of the variable to contain the `mxArray` name.

**Description**

`matGetNextVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`, from the file's current file offset. MATLAB returns the name of the `mxArray` in `name`.

If `pr`, `pi`, `ir`, and `jc` are set to nonzero values when loaded with `matGetVariable`, matGetNextVariableInfo sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

# matGetString (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = matGetVariable(mfp, name)
mxGetString(pm, str, strlen)
```

instead of

```
matGetString(mfp, name, str, strlen)
```

**See Also** `matGetVariable`, `mxGetString`

**Purpose** Read `mxArrays` from MAT-files

**Fortran Syntax**

```
integer*4 function matGetVariable(mfp, name)
integer*4 mfp
character*(*) name
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray` to get from MAT-file.

**Description** This routine allows you to copy an `mxArray` out of a MAT-file.

`matGetVariable` reads the named `mxArray` from the MAT-file pointed to by `mfp` and returns a pointer to a newly allocated `mxArray` structure, or `0` if the attempt fails.

Be careful in your code to free the `mxArray` created by this routine when you are finished with it.

# matGetVariableInfo

**Purpose**

Load array header information only

**Fortran Syntax**

```
integer*4 function matGetVariableInfo(mfp, name);
integer*4 mfp
character*(*) name
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray`.

**Description**

`matGetVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`. It recursively creates the cells/structures through their leaf elements, but does not include `pr`, `pi`, `ir`, and `jc`.

If `pr`, `pi`, `ir`, and `jc` are set to nonzero values when loaded with `matGetVariable`, matGetVariableInfo sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

## Purpose

Open MAT-file

## Fortran Syntax

```
integer*4 function matOpen(filename, mode)
integer*4 mfp
character*(*) filename, mode
```

## Arguments

`filename`
Name of file to open.

`mode`
File opening mode. Legal values for `mode` are:

| | |
|---|---|
| `r` | Open file for reading only. Determines the current version of the MAT-file by inspecting the files and preserves the current version. |
| `u` | Open file for update, both reading and writing, but does not create the file if the file does not exist (equivalent to the `r+` mode of `fopen`). Determines the current version of the MAT-file by inspecting the files and preserves the current version. |
| `w` | Open file for writing only. Deletes previous contents, if any. |
| `w4` | Create a Level 4 MAT-file, compatible with MATLAB Versions 4 and earlier. |
| `wL` | Open file for writing character data using the default character set for your system. The resulting MAT-file can be read with MATLAB version 6 or 6.5.<br>If you do not use the `wL` mode switch, MATLAB writes character data to the MAT-file using Unicode character encoding by default. |
| `wz` | Open file for writing compressed data. |

`mfp`
Pointer to MAT-file information.

**Description**

This routine allows you to open MAT-files for reading and writing.

`matOpen` opens the named file and returns a file handle, or 0 if the open fails.

**Examples**

See `matdemo1.f` and `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a Fortran program.

## Compatibility

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
matPutVariable(mfp, name, pm)
```

instead of

```
mxSetName(pm, name);
matPutArray(pm, mfp);
```

## See Also

`matPutVariable`

# matPutArrayAsGlobal (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matPutVariableAsGlobal` instead.

**See Also** `matPutVariableAsGlobal`

## Compatibility

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mxCreateDoubleMatrix(m, n, 1)
mxSetPr(pm, pr)
mxSetPi(pm, pi)
matPutVariable(mfp, name, pm)

mxDestroyArray(pm)
```

instead of

```
matPutFull(mfp, name, m, n, pr, pi)
```

## See Also

`mxCreateDoubleMatrix`, `mxSetPr`, `mxSetPi`, `matPutVariable`, `mxDestroyArray`

# matPutMatrix (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matPutVariable` instead.

**See Also** `matPutVariable`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mxCreateString(str)
matPutVariable(mfp, name, pm)
mxDestroyArray(pm)
```

instead of

```
matPutString(mfp, name, str)
```

**See Also**

`mxCreateString`, `matPutVariable`, `mxDestroyArray`

# matPutVariable

**Purpose**

Write `mxArrays` to MAT-files

**Fortran Syntax**

```
integer*4 function matPutVariable(mfp, name, pm)
integer*4 mfp, pm
character*(*) name
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray` to put into MAT-file.

`pm`
`mxArray` pointer.

**Description**

This routine allows you to put an `mxArray` into a MAT-file.

`matPutVariable` writes `mxArray pm` to the MAT-file `mfp`. If the `mxArray` does not exist in the MAT-file, it is appended to the end. If an `mxArray` with the same name already exists in the file, the existing `mxArray` is replaced with the new `mxArray` by rewriting the file. The size of the new `mxArray` can be different than the existing `mxArray`.

`matPutVariable` returns `0` if successful and nonzero if an error occurs.

**Purpose**

Put `mxArrays` into MAT-files as originating from global workspace

**Fortran Syntax**

```
integer*4 function matPutVariableAsGlobal(mfp, name, pm)
integer*4 mfp, pm
character*(*) name
```

**Arguments**

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray` to put into MAT-file.

`pm`
`mxArray` pointer.

**Description**

This routine allows you to put an `mxArray` into a MAT-file. `matPutVariableAsGlobal` is similar to `matPutVariable`, except the array, when loaded by MATLAB, is placed into the global workspace and a reference to it is set in the local workspace. If you write to a MATLAB 4 format file, `matPutVariableAsGlobal` will not load it as global, and will act the same as `matPutVariable`.

`matPutVariableAsGlobal` writes `mxArray pm` to the MAT-file `mfp`. If the `mxArray` does not exist in the MAT-file, it is appended to the end. If an `mxArray` with the same name already exists in the file, the existing `mxArray` is replaced with the new `mxArray` by rewriting the file. The size of the new `mxArray` can be different than the existing `mxArray`.

`matPutVariableAsGlobal` returns `0` if successful and nonzero if an error occurs.

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# MX Array Manipulation (Fortran)

| | |
|---|---|
| `mxAddField` | Add field to structure array |
| `mxCalcSingleSubscript` | Return offset from first element to desired element |
| `mxCalloc` | Allocate dynamic memory using MATLAB memory manager |
| `mxClassIDFromClassName` | Get identifier that corresponds to class |
| `mxClearLogical (Obsolete)` | Clear logical flag |
| `mxCopyCharacterToPtr` | Copy `character` values from Fortran array to pointer array |
| `mxCopyComplex8ToPtr` | Copy `COMPLEX*8` values from Fortran array to pointer array |
| `mxCopyComplex16ToPtr` | Copy `COMPLEX*16` values from Fortran array to pointer array |
| `mxCopyInteger1ToPtr` | Copy `INTEGER*1` values from Fortran array to pointer array |
| `mxCopyInteger2ToPtr` | Copy `INTEGER*2` values from Fortran array to pointer array |
| `mxCopyInteger4ToPtr` | Copy `INTEGER*4` values from Fortran array to pointer array |
| `mxCopyPtrToCharacter` | Copy `character` values from pointer array to Fortran array |
| `mxCopyPtrToComplex8` | Copy `COMPLEX*8` values from pointer array to Fortran array |
| `mxCopyPtrToComplex16` | Copy `COMPLEX*16` values from pointer array to Fortran array |
| `mxCopyPtrToInteger1` | Copy `INTEGER*1` values from pointer array to Fortran array |
| `mxCopyPtrToInteger2` | Copy `INTEGER*2` values from pointer array to Fortran array |
| `mxCopyPtrToInteger4` | Copy `INTEGER*4` values from pointer array to Fortran array |
| `mxCopyPtrToPtrArray` | Copy pointer values from pointer array to Fortran array |
| `mxCopyPtrToReal4` | Copy `REAL*4` values from pointer array to Fortran array |
| `mxCopyPtrToReal8` | Copy `REAL*8` values from pointer array to Fortran array |
| `mxCopyReal4ToPtr` | Copy `REAL*4` values from Fortran array to pointer array |
| `mxCopyReal8ToPtr` | Copy `REAL*8` values from Fortran array to pointer array |
| `mxCreateCellArray` | Create unpopulated N-dimensional cell `mxArray` |
| `mxCreateCellMatrix` | Create unpopulated two-dimensional cell `mxArray` |

| | |
|---|---|
| `mxCreateCharArray` | Create unpopulated N-dimensional string `mxArray` |
| `mxCreateCharMatrixFromStrings` | Create populated two-dimensional string `mxArray` |
| `mxCreateDoubleMatrix` | Create unpopulated two-dimensional, double-precision, floating-point `mxArray` |
| `mxCreateFull (Obsolete)` | Create unpopulated two-dimensional `mxArray` |
| `mxCreateNumericArray` | Create unpopulated N-dimensional numeric `mxArray` |
| `mxCreateNumericMatrix` | Create numeric matrix and initialize data elements to 0 |
| `mxCreateScalarDouble` | Create scalar, double-precision array initialized to specified value |
| `mxCreateSparse` | Create two-dimensional unpopulated sparse `mxArray` |
| `mxCreateString` | Create 1-by-n `character` array initialized to specified string |
| `mxCreateStructArray` | Create unpopulated N-dimensional structure `mxArray` |
| `mxCreateStructMatrix` | Create unpopulated two-dimensional structure `mxArray` |
| `mxDestroyArray` | Free dynamic memory allocated by `mxCreate` |
| `mxDuplicateArray` | Make deep copy of array |
| `mxFree` | Free dynamic memory allocated by `mxCalloc` |
| `mxFreeMatrix (Obsolete)` | Free dynamic memory allocated by `mxCreateFull` and `mxCreateSparse` |
| `mxGetCell` | Get cell's contents |
| `mxGetClassID` | Get `mxArray`'s class |
| `mxGetClassName` | Get `mxArray`'s class |
| `mxGetData` | Get pointer to data |
| `mxGetDimensions` | Get pointer to dimensions array |
| `mxGetElementSize` | Get number of bytes required to store each data element |
| `mxGetEps` | Get value of `eps` |
| `mxGetField` | Get field value, given field name and index in structure array |

| | |
|---|---|
| `mxGetFieldByNumber` | Get field value, given field number and index in structure array |
| `mxGetFieldNameByNumber` | Get field name, given field number in structure array |
| `mxGetFieldNumber` | Get field number, given field name in structure array |
| `mxGetImagData` | Get pointer to imaginary data of `mxArray` |
| `mxGetInf` | Get value of infinity |
| `mxGetIr` | Get `ir` array |
| `mxGetJc` | Get `jc` array |
| `mxGetM` | Get number of rows |
| `mxGetN` | Get total number of columns |
| `mxGetName (Obsolete)` | Get name of specified `mxArray` |
| `mxGetNaN` | Get the value of `NaN` |
| `mxGetNumberOfDimensions` | Get number of dimensions |
| `mxGetNumberOfElements` | Get number of elements in array |
| `mxGetNumberOfFields` | Get number of fields in structure `mxArray` |
| `mxGetNzmax` | Get number of elements in `ir`, `pr`, and `pi` arrays |
| `mxGetPi` | Get imaginary data elements of `mxArray` |
| `mxGetPr` | Get real data elements of `mxArray` |
| `mxGetScalar` | Get real component of first data element in `mxArray` |
| `mxGetString` | Create `character` array from `mxArray` |
| `mxIsCell` | Determine if input is cell `mxArray` |
| `mxIsChar` | Determine if input is string `mxArray` |
| `mxIsClass` | Determine if `mxArray` is member of specified class |
| `mxIsComplex` | Determine if `mxArray` is complex |
| `mxIsDouble` | Determine if `mxArray` is of type `double` |
| `mxIsEmpty` | Determine if `mxArray` is empty |
| `mxIsFinite` | Determine if value is finite |

| | |
|---|---|
| `mxIsFromGlobalWS` | Determine if `mxArray` copied from MATLAB global workspace |
| `mxIsFull (Obsolete)` | Determine if `mxArray` is full |
| `mxIsInf` | Determine if value is infinite |
| `mxIsInt8` | Determine if input is `mxArray` of signed 8-bit integers |
| `mxIsInt16` | Determine if input is `mxArray` of signed 16-bit integers |
| `mxIsInt32` | Determine if input is `mxArray` of signed 32-bit integers |
| `mxIsLogical` | Determine if `mxArray` is Boolean |
| `mxIsNaN` | Determine if input is `NaN` |
| `mxIsNumeric` | Determine if `mxArray` contains numeric data |
| `mxIsSingle` | Determine if `mxArray` represents data as single-precision, floating-point numbers |
| `mxIsSparse` | Determine if `mxArray` is sparse |
| `mxIsString (Obsolete)` | Determine if `mxArray` contains `character` array |
| `mxIsStruct` | Determine if input is `mxArray` structure |
| `mxIsUint8` | Determine if input is `mxArray` of unsigned 8-bit integers |
| `mxIsUint16` | Determine if input is `mxArray` of unsigned 16-bit integers |
| `mxIsUint32` | Determine if input is `mxArray` of unsigned 32-bit integers |
| `mxMalloc` | Allocate dynamic memory using the MATLAB memory manager |
| `mxRealloc` | Reallocate memory |
| `mxRemoveField` | Remove field from structure array |
| `mxSetCell` | Set value of one cell |
| `mxSetData` | Set pointer to data |
| `mxSetDimensions` | Modify number/size of dimensions |
| `mxSetField` | Set field value of structure array, given field name/index |
| `mxSetFieldByNumber` | Set field value in structure array, given field number/index |
| `mxSetImagData` | Set imaginary data pointer for `mxArray` |

| | |
|---|---|
| `mxSetIr` | Set `ir` array of sparse `mxArray` |
| `mxSetJc` | Set `jc` array of sparse `mxArray` |
| `mxSetLogical (Obsolete)` | Set logical flag |
| `mxSetM` | Set number of rows |
| `mxSetN` | Set number of columns |
| `mxSetName (Obsolete)` | Set name of `mxArray` |
| `mxSetNzmax` | Set storage space for nonzero elements |
| `mxSetPi` | Set new imaginary data for `mxArray` |
| `mxSetPr` | Set new real data for `mxArray` |

# mxAddField

## Purpose

Add field to structure array

## Fortran Syntax

```
integer*4 function mxAddField(pm, fieldname)
integer*4 pm
character*(*) fieldname
```

## Arguments

`pm`
Pointer to a structure `mxArray`.

`fieldname`
The name of the field you want to add.

## Returns

Field number on success, or `0` if inputs are invalid or an out-of-memory condition occurs.

## Description

Call `mxAddField` to add a field to a structure array. You must then create the values with the `mxCreate*` functions and use `mxSetFieldByNumber` to set the individual values for the field.

## See Also

`mxRemoveField`, `mxSetFieldByNumber`

**Purpose** Return offset from first element to desired element

**Fortran Syntax**

```
integer*4 function mxCalcSingleSubscript(pm, nsubs, subs)
integer*4 pm, nsubs, subs
```

**Arguments**

`pm`
Pointer to an `mxArray`.

`nsubs`
The number of elements in the `subs` array. Typically, you set `nsubs` equal to the number of dimensions in the `mxArray` that `pm` points to.

`subs`
An array of integers. Each value in the array should specify that dimension's subscript. The value in `subs(1)` specifies the row subscript, and the value in `subs(2)` specifies the column subscript. Use 1-based indexing to specify the desired array element. For example, to express the starting element of a two-dimensional `mxArray` in `subs`, set `subs(1)` to 1 and `subs(2)` to `1`.

**Returns** The number of elements between the start of the `mxArray` and the specified subscript. This returned number is called an "index"; many `mx` routines (for example, `mxGetField`) require an index as an argument.

If `subs` describes the starting element of an `mxArray`, `mxCalcSingleSubscript` returns 0. If `subs` describes the final element of an `mxArray`, then `mxCalcSingleSubscript` returns `N-1` (where `N` is the total number of elements).

**Description** Call `mxCalcSingleSubscript` to determine how many elements there are between the beginning of the `mxArray` and a given element of that `mxArray`. For example, given a subscript like `(5,7)`, `mxCalcSingleSubscript` returns the distance from the `(1,1)` element of the array to the `(5,7)` element. Remember that the `mxArray` data type internally represents all data elements in a one-dimensional array no matter how many dimensions the MATLAB `mxArray` appears to have.

Use `mxCalcSingleSubscript` with functions that interact with multidimensional cells and structures. `mxGetCell` and `mxSetCell` are two such functions.

**See Also** `mxGetCell`, `mxSetCell`

# mxCalloc

## Purpose

Allocate dynamic memory for an array using MATLAB memory manager

## Fortran Syntax

```
integer*4 function mxCalloc(n, size)
integer*4 n, size
```

## Arguments

`n`
Number of elements to allocate. This must be a nonnegative number.

`size`
Number of bytes per element.

## Returns

A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCalloc` returns 0. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxCalloc` is unsuccessful when there is insufficient free heap space.

## Description

The MATLAB memory management facility maintains a list of all memory allocated by `mxCalloc` (and by the `mxCreate` calls). The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

By default, in a MEX-file, `mxCalloc` generates nonpersistent `mxCalloc` data. In other words, the memory management facility automatically deallocates the memory as soon as the MEX-file ends. When you finish using the memory allocated by `mxCalloc`, call `mxFree`. `mxFree` deallocates the memory.

`mxCalloc` works differently in MEX-files than in stand-alone MATLAB applications. In MEX-files, `mxCalloc` automatically

- Allocates enough contiguous heap space to hold `n` elements.
- Initializes all `n` elements to 0.
- Registers the returned heap space with the MATLAB memory management facility.

In stand-alone MATLAB applications, the MATLAB memory manager is not used.

## See Also

`mxFree`, `mxMalloc`, `mxRealloc`

# mxClassIDFromClassName

**Purpose**

Get identifier that corresponds to class

**Fortran Syntax**

```
integer*4 function mxClassIDFromClassName(classname)
character*(*) classname
```

**Arguments**

*classname*
A `character` array specifying a MATLAB class name. Use one of the strings from the table below.

**Returns**

A numeric identifier used internally by MATLAB to represent the MATLAB class, *classname*. Returns `0` if *classname* is not a recognized MATLAB class.

**Description**

Use `mxClassIDFromClassName` to obtain an identifier for any class that is recognized by MATLAB. This function is most commonly used to provide a `classid` argument to `mxCreateNumericArray` and `mxCreateNumericMatrix`.

Valid choices for *classname* are shown below. MATLAB returns `0` if *classname* is unrecognized.

| | | | |
|---|---|---|---|
| cell | char | double | function_handle |
| int8 | int16 | int32 | logical |
| object | single | struct | uint8 |
| uint16 | uint32 | | |

**See Also**

`mxGetClassName`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

# mxClearLogical (Obsolete)

**Compatibility**

As of MATLAB version 6.5, `mxClearLogical` is obsolete. Support for `mxClearLogical` may be removed in a future version.

This function turns off the `mxArray`'s logical flag. This flag, when cleared, tells MATLAB that the `mxArray`'s data is to be treated as numeric data rather than as Boolean data. If the logical flag is on, then MATLAB treats a 0 value as meaning `false` and a nonzero value as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

**See Also**

`mxIsLogical`, `mxSetLogical (Obsolete)`, `logical`

**Purpose**

Copy `character` values from Fortran array to pointer array

**Fortran Syntax**

```
subroutine mxCopyCharacterToPtr(y, px, n)
character*(*) y
integer*4 px, n
```

**Arguments**

`y`
`character` Fortran array.

`px`
Pointer to `character` or `name` array.

`n`
Number of elements to copy.

**Description**

`mxCopyCharacterToPtr` copies `n` `character` values from the Fortran `character` array `y` into the MATLAB string array pointed to by `px`. This subroutine is essential for copying character data between MATLAB pointer arrays and ordinary Fortran `character` arrays.

**See Also**

`mxCopyPtrToCharacter`, `mxCreateCharArray`, `mxCreateString`, `mxCreateCharMatrixFromStrings`

# mxCopyComplex8ToPtr

## Purpose

Copy `COMPLEX*8` values from Fortran array to pointer array

## Fortran Syntax

```
subroutine mxCopyComplex8ToPtr(y, pr, pi, n)
complex*8 y(n)
integer*4 pr, pi, n
```

## Arguments

`y`
`COMPLEX*8` Fortran array.

`pr`
Pointer to the real data of a single-precision MATLAB array.

`pi`
Pointer to the imaginary data of a single-precision MATLAB array.

`n`
Number of elements to copy.

## Description

`mxCopyComplex8ToPtr` copies `n` `COMPLEX*8` values from the Fortran `COMPLEX*8` array `y` into the MATLAB arrays pointed to by `pr` and `pi`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

## See Also

`mxCopyPtrToComplex8`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

**Purpose** Copy `COMPLEX*16` values from Fortran array to pointer array

**Fortran Syntax**

```
subroutine mxCopyComplex16ToPtr(y, pr, pi, n)
complex*16 y(n)
integer*4 pr, pi, n
```

**Arguments**

`y`
`COMPLEX*16` Fortran array.

`pr`
Pointer to the real data of a double-precision MATLAB array.

`pi`
Pointer to the imaginary data of a double-precision MATLAB array.

`n`
Number of elements to copy.

**Description**

`mxCopyComplex16ToPtr` copies `n` `COMPLEX*16` values from the Fortran `COMPLEX*16` array `y` into the MATLAB arrays pointed to by `pr` and `pi`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

**See Also**

`mxCopyPtrToComplex16`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

# mxCopyInteger1ToPtr

## Purpose

Copy INTEGER*1 values from Fortran array to pointer array

## Fortran Syntax

```
subroutine mxCopyInteger1ToPtr(y, px, n)
integer*1 y(n)
integer*4 px, n
```

## Arguments

y
INTEGER*1 Fortran array.

px
Pointer to ir or jc array.

n
Number of elements to copy.

## Description

mxCopyInteger1ToPtr copies n INTEGER*1 values from the Fortran INTEGER*1 array y into the MATLAB array pointed to by px, either an ir or jc array. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

---

**Note** This function can only be used with sparse matrices.

---

## See Also

mxCopyPtrToInteger1, mxCreateNumericArray, mxCreateNumericMatrix

**Purpose**

Copy `INTEGER*2` values from Fortran array to pointer array

**Fortran Syntax**

```
subroutine mxCopyInteger2ToPtr(y, px, n)
integer*2 y(n)
integer*4 px, n
```

**Arguments**

`y`
`INTEGER*2` Fortran array.

`px`
Pointer to `ir` or `jc` array.

`n`
Number of elements to copy.

**Description**

`mxCopyInteger2ToPtr` copies `n` `INTEGER*2` values from the Fortran `INTEGER*2` array `y` into the MATLAB array pointed to by `px`, either an `ir` or `jc` array. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

---

**Note** This function can only be used with sparse matrices.

---

**See Also**

`mxCopyPtrToInteger2`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

# mxCopyInteger4ToPtr

## Purpose

Copy `INTEGER*4` values from Fortran array to pointer array

## Fortran Syntax

```
subroutine mxCopyInteger4ToPtr(y, px, n)
integer*4 y(n)
integer*4 px, n
```

## Arguments

`y`
`INTEGER*4` Fortran array.

`px`
Pointer to `ir` or `jc` array.

`n`
Number of elements to copy.

## Description

`mxCopyInteger4ToPtr` copies `n` `INTEGER*4` values from the Fortran `INTEGER*4` array `y` into the MATLAB array pointed to by `px`, either an `ir` or `jc` array. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

---

**Note** This function can only be used with sparse matrices.

---

## See Also

`mxCopyPtrToInteger4`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

**Purpose**

Copy `character` values from pointer array to Fortran array

**Fortran Syntax**

```
subroutine mxCopyPtrToCharacter(px, y, n)
character*(*) y
integer*4 px, n
```

**Arguments**

`px`
Pointer to `character` or `name` array.

`y`
`character` Fortran array.

`n`
Number of elements to copy.

**Description**

`mxCopyPtrToCharacter` copies `n` `character` values from the MATLAB array pointed to by `px` into the Fortran `character` array `y`. This subroutine is essential for copying character data from MATLAB pointer arrays into ordinary Fortran `character` arrays.

**Examples**

See `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also**

`mxCopyCharacterToPtr`, `mxCreateCharArray`, `mxCreateString`, `mxCreateCharMatrixFromStrings`

# mxCopyPtrToComplex8

## Purpose

Copy `COMPLEX*8` values from pointer array to Fortran array

## Fortran Syntax

```
subroutine mxCopyPtrToComplex8(pr, pi, y, n)
complex*8 y(n)
integer*4 pr, pi, n
```

## Arguments

`pr`
Pointer to the real data of a single-precision MATLAB array.

`pi`
Pointer to the imaginary data of a single-precision MATLAB array.

`y`
`COMPLEX*8` Fortran array.

`n`
Number of elements to copy.

## Description

`mxCopyPtrToComplex8` copies `n` `COMPLEX*8` values from the MATLAB arrays pointed to by `pr` and `pi` into the Fortran `COMPLEX*8` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

## See Also

`mxCopyComplex8ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

# mxCopyPtrToComplex16

## Purpose

Copy COMPLEX*16 values from pointer array to Fortran array

## Fortran Syntax

```
subroutine mxCopyPtrToComplex16(pr, pi, y, n)
complex*16 y(n)
integer*4 pr, pi, n
```

## Arguments

`pr`
Pointer to the real data of a double-precision MATLAB array.

`pi`
Pointer to the imaginary data of a double-precision MATLAB array.

`y`
COMPLEX*16 Fortran array.

`n`
Number of elements to copy.

## Description

`mxCopyPtrToComplex16` copies `n` `COMPLEX*16` values from the MATLAB arrays pointed to by `pr` and `pi` into the Fortran `COMPLEX*16` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

## See Also

`mxCopyComplex16ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

# mxCopyPtrToInteger1

**Purpose** Copy INTEGER*1 values from pointer array to Fortran array

**Fortran Syntax**

```
subroutine mxCopyPtrToInteger1(px, y, n)
integer*1 y(n)
integer*4 px, n
```

**Arguments**

px
Pointer to ir or jc array.

y
INTEGER*1 Fortran array.

n
Number of elements to copy.

**Description**

mxCopyPtrToInteger1 copies n INTEGER*1 values from the MATLAB array pointed to by px, either an ir or jc array, into the Fortran INTEGER*1 array y. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

---

**Note** This function can only be used with sparse matrices.

---

**See Also** mxCopyInteger1ToPtr, mxCreateNumericArray, mxCreateNumericMatrix

**Purpose**

Copy `INTEGER*2` values from pointer array to Fortran array

**Fortran Syntax**

```
subroutine mxCopyPtrToInteger2(px, y, n)
integer*2 y(n)
integer*4 px, n
```

**Arguments**

`px`
Pointer to `ir` or `jc` array.

`y`
`INTEGER*2` Fortran array.

`n`
Number of elements to copy.

**Description**

`mxCopyPtrToInteger2` copies `n` `INTEGER*2` values from the MATLAB array pointed to by `px`, either an `ir` or `jc` array, into the Fortran `INTEGER*2` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

---

**Note** This function can only be used with sparse matrices.

---

**See Also**

`mxCopyInteger2ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

# mxCopyPtrToInteger4

## Purpose

Copy `INTEGER*4` values from pointer array to Fortran array

## Fortran Syntax

```
subroutine mxCopyPtrToInteger4(px, y, n)
integer*4 y(n)
integer*4 px, n
```

## Arguments

`px`
Pointer to `ir` or `jc` array.

`y`
`INTEGER*4` Fortran array.

`n`
Number of elements to copy.

## Description

`mxCopyPtrToInteger4` copies `n` `INTEGER*4` values from the MATLAB array pointed to by `px`, either an `ir` or `jc` array, into the Fortran `INTEGER*4` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

---

**Note** This function can only be used with sparse matrices.

---

## See Also

`mxCopyInteger4ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

**Purpose**

Copy pointer values from pointer array to Fortran array

**Fortran Syntax**

```
subroutine mxCopyPtrToPtrArray(px, y, n)
integer*4 y(n)
integer*4 px, n
```

**Arguments**

`px`
Pointer to pointer array.

`y`
`INTEGER*4` Fortran array.

`n`
Number of pointers to copy.

**Description**

`mxCopyPtrToPtrArray` copies `n` pointers from the MATLAB array pointed to by `px` into the Fortran array `y`. This subroutine is essential for copying the output of `matGetDir` into an array of pointers. After calling this function, each element of `y` contains a pointer to a string. You can convert these strings to Fortran character arrays by passing each element of `y` as the first argument to `mxCopyPtrToCharacter`.

**Examples**

See `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also**

`matGetDir`, `mxCopyPtrToCharacter`

# mxCopyPtrToReal4

## Purpose

Copy `REAL*4` values from pointer array to Fortran array

## Fortran Syntax

```
subroutine mxCopyPtrToReal4(px, y, n)
real*4 y(n)
integer*4 px, n
```

## Arguments

`px`
Pointer to the real or imaginary data of a single-precision MATLAB array.

`y`
`REAL*4` Fortran array.

`n`
Number of elements to copy.

## Description

`mxCopyPtrToReal4` copies `n` `REAL*4` values from the MATLAB array pointed to by `px`, either a `pr` or `pi` array, into the Fortran `REAL*4` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

## See Also

`mxCopyReal4ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

**Purpose**

Copy REAL*8 values from pointer array to Fortran array

**Fortran Syntax**

```
subroutine mxCopyPtrToReal8(px, y, n)
real*8 y(n)
integer*4 px, n
```

**Arguments**

px
Pointer to the real or imaginary data of a double-precision MATLAB array.

y
REAL*8 Fortran array.

n
Number of elements to copy.

**Description**

mxCopyPtrToReal8 copies n REAL*8 values from the MATLAB array pointed to by px, either a pr or pi array, into the Fortran REAL*8 array y. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

**Examples**

See fengdemo.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also**

mxCopyReal8ToPtr, mxCreateNumericArray, mxCreateNumericMatrix, mxGetData, mxGetImagData

# mxCopyReal4ToPtr

**Purpose** Copy `REAL*4` values from Fortran array to pointer array

**Fortran Syntax**

```
subroutine mxCopyReal4ToPtr(y, px, n)
real*4 y(n)
integer*4 px, n
```

**Arguments**

`y`
`REAL*4` Fortran array.

`px`
Pointer to the real or imaginary data of a single-precision MATLAB array.

`n`
Number of elements to copy.

**Description** `mxCopyReal4ToPtr(y,px,n)` copies `n` `REAL*4` values from the Fortran `REAL*4` array `y` into the MATLAB array pointed to by `px`, either a `pr` or `pi` array. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

**See Also** `mxCopyPtrToReal4`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

## Purpose

Copy `REAL*8` values from Fortran array to pointer array

## Fortran Syntax

```
subroutine mxCopyReal8ToPtr(y, px, n)
real*8 y(n)
integer*4 px, n
```

## Arguments

`y`
`REAL*8` Fortran array.

`px`
Pointer to the real or imaginary data of a double-precision MATLAB array.

`n`
Number of elements to copy.

## Description

`mxCopyReal8ToPtr(y,px,n)` copies `n` `REAL*8` values from the Fortran `REAL*8` array `y` into the MATLAB array pointed to by `px`, either a `pr` or `pi` array. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

## Examples

See `matdemo1.f` and `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

## See Also

`mxCopyPtrToReal8`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

# mxCreateCellArray

## Purpose

Create unpopulated N-dimensional cell `mxArray`

## Fortran Syntax

```
integer*4 function mxCreateCellArray(ndim, dims)
integer*4 ndim, dims
```

## Arguments

`ndim`
The desired number of dimensions in the created cell. For example, to create a three-dimensional cell `mxArray`, set `ndim` to `3`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the `mxArray` in that dimension. For example, setting `dims(1)` to `5` and `dims(2)` to `7` establishes a 5-by-7 `mxArray`. In most cases, there should be `ndim` elements in the `dims` array.

## Returns

A pointer to the created cell `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateCellArray` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. The most common cause of failure is insufficient free heap space.

## Description

Use `mxCreateCellArray` to create a cell `mxArray` whose size is defined by `ndim` and `dims`. For example, to establish a three-dimensional cell `mxArray` having dimensions 4-by-8-by-7, set

```
ndim = 3;
dims(1) = 4; dims(2) = 8; dims(3) = 7;
```

The created cell `mxArray` is unpopulated; that is, `mxCreateCellArray` initializes each cell to `0`. To put data into a cell, call `mxSetCell`.

Any trailing singleton dimensions specified in the `dims` argument are automatically removed from the resulting array. For example, if `ndim` equals `5` and `dims` equals `[4 1 7 1 1]`, the resulting array is given the dimensions 4-by-1-by-7.

## See Also

`mxCreateCellMatrix`, `mxGetCell`, `mxSetCell`, `mxIsCell`

**Purpose**

Create unpopulated two-dimensional cell mxArray

**Fortran Syntax**

```
integer*4 function mxCreateCellMatrix(m, n)
integer*4 m, n
```

**Arguments**

m
The desired number of rows.

n
The desired number of columns.

**Returns**

A pointer to the created cell mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCellMatrix returns 0. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for mxCreateCellMatrix to be unsuccessful.

**Description**

Use mxCreateCellMatrix to create an m-by-n two-dimensional cell mxArray. The created cell mxArray is unpopulated; that is, mxCreateCellMatrix initializes each cell to 0. To put data into the cells, call mxSetCell.

mxCreateCellMatrix is identical to mxCreateCellArray except that mxCreateCellMatrix can create two-dimensional mxArrays only, but mxCreateCellArray can create mxArrays having any number of dimensions greater than 1.

**See Also**

mxCreateCellArray

# mxCreateCharArray

**Purpose** Create unpopulated N-dimensional character mxArray

**Fortran Syntax**

```
integer*4 function mxCreateCharArray(ndim, dims)
integer*4 ndim, dims
```

**Arguments**

ndim
The desired number of dimensions in the character mxArray. You must specify a positive number. If you specify 0, 1, or 2, mxCreateCharArray creates a two-dimensional mxArray.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims(1) to 5 and dims(2) to 7 establishes a 5-by-7 character mxArray. The dims array must have at least ndim elements.

**Returns** A pointer to the created character mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCharArray returns 0. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for mxCreateCharArray to be unsuccessful.

**Description** Use mxCreateCharArray to create an mxArray of characters whose size is defined by ndim and dims. For example, to establish a two-dimensional mxArray of characters having dimensions 12-by-3, set

```
ndim = 2;
dims(1) = 12; dims(2) = 3;
```

The created mxArray is unpopulated; that is, mxCreateCharArray initializes each character to INTEGER*2 0.

Any trailing singleton dimensions specified in the dims argument are automatically removed from the resulting array. For example, if ndim equals 5 and dims equals [4 1 7 1 1], the resulting array is given the dimensions 4-by-1-by-7.

**See Also** mxCreateString

**Purpose**

Create populated two-dimensional char `mxArray`

**Fortran Syntax**

```
integer*4 function mxCreateCharMatrixFromStrings(m, str)
integer*4 m
character*(*) str(m)
```

**Arguments**

`m`
The desired number of rows in the created string `mxArray`. The value you specify for `m` should equal the size of the `str` array.

`str`
A Fortran `character*n` array of size `m`, where each element of the array is `n` bytes.

**Returns**

A pointer to the created char `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateCharMatrixFromStrings` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates, and control returns to the MATLAB prompt. Insufficient free heap space is the primary reason for `mxCreateCharMatrixFromStrings` to be unsuccessful. Another possible reason for failure is that `str` contains fewer than `m` strings.

**Description**

Use `mxCreateCharMatrixFromStrings` to create a two-dimensional string `mxArray`, where each row is initialized to `str`. The created `mxArray` has dimensions `m`-by-`n`, where `n` is the length of the number of characters in `str(i)`.

**See Also**

`mxCreateCharArray`, `mxCreateString`

# mxCreateDoubleMatrix

**Purpose**

Create unpopulated two-dimensional, double-precision, floating-point `mxArray`

**Fortran Syntax**

```
integer*4 function mxCreateDoubleMatrix(m, n, ComplexFlag)
integer*4 m, n, ComplexFlag
```

**Arguments**

`m`
The desired number of rows.

`n`
The desired number of columns.

`ComplexFlag`
If the data you plan to put into the `mxArray` has no imaginary component, specify `0`. If the data has some imaginary components, specify `1`.

**Returns**

A pointer to the created `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateDoubleMatrix` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. `mxCreateDoubleMatrix` is unsuccessful when there is not enough free heap space to create the `mxArray`.

**Description**

Use `mxCreateDoubleMatrix` to create an `m`-by-`n` `mxArray`.

If you set `ComplexFlag` to `0`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements and initializes each element to 0.0.

If you set `ComplexFlag` to `1`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements and `m`-by-`n` imaginary elements. It initializes each real and imaginary element to 0.0.

Call `mxDestroyArray` when you finish using the `mxArray`. `mxDestroyArray` deallocates the `mxArray` and its associated real and complex elements.

**See Also**

`mxCreateNumericArray`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxCreateDoubleMatrix` instead.

**See Also**

`mxCreateSparse`

# mxCreateNumericArray

**Purpose**

Create unpopulated N-dimensional numeric mxArray

**Fortran Syntax**

```
integer*4 function mxCreateNumericArray(ndim, dims, classid,
  ComplexFlag)
integer*4 ndim, dims, classid, ComplexFlag
```

**Arguments**

`ndim`
Number of dimensions. If you specify a value for `ndim` that is less than 2, `mxCreateNumericArray` automatically sets the number of dimensions to `2`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims(1)` to `5` and `dims(2)` to `7` establishes a 5-by-7 `mxArray`. In most cases, there should be `ndim` elements in the `dims` array.

`classid`
A numerical identifier that represents a particular MATLAB class. Use the function, `mxClassIDFromClassName`, to derive the `classid` value from a class name `character` array.

The `classid` tells MATLAB how you want the numerical array data to be represented in memory. For example, specifying the `int32` class causes each piece of numerical data in the `mxArray` to be represented as a 32-bit signed integer.

`mxCreateNumericArray` accepts any of the MATLAB signed numeric classes, shown to the left in the table below.

`ComplexFlag`
If the data you plan to put into the `mxArray` has no imaginary components, specify `0`. If the data will have some imaginary components, specify `1`.

**Returns**

A pointer to the created `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateNumericArray` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. `mxCreateNumericArray` is unsuccessful when there is not enough free heap space to create the `mxArray`.

## Description

Call mxCreateNumericArray to create an N-dimensional mxArray in which all data elements have the numeric data type specified by classid. After creating the mxArray, mxCreateNumericArray initializes all its real data elements to 0. If ComplexFlag is set to 1, mxCreateNumericArray also initializes all its imaginary data elements to 0.

The following table shows the Fortran data types that are equivalent to MATLAB classes. Use these as shown in the example below.

| MATLAB Class Name | Fortran Type |
|---|---|
| int8 | INTEGER*1 |
| int16 | INTEGER*2 |
| int32 | INTEGER*4 |
| single | REAL*4 |
| double | REAL*8 |
| single, with imaginary components | COMPLEX*8 |
| double, with imaginary components | COMPLEX*16 |

mxCreateNumericArray differs from mxCreateDoubleMatrix in two important respects:

- All data elements in mxCreateDoubleMatrix are double-precision, floating-point numbers. The data elements in mxCreateNumericArray could be any numerical type, including different integer precisions.
- mxCreateDoubleMatrix can create two-dimensional arrays only; mxCreateNumericArray can create arrays of two or more dimensions.

mxCreateNumericArray allocates dynamic memory to store the created mxArray. When you finish with the created mxArray, call mxDestroyArray to deallocate its memory.

Any trailing singleton dimensions specified in the dims argument are automatically removed from the resulting array. For example, if ndim equals 5 and dims equals [4 1 7 1 1], the resulting array is given the dimensions 4-by-1-by-7.

## Examples

To create a 4-by-4-by-2 array of `REAL*8` elements having no imaginary components, use

```
C      Create 4x4x2 mxArray of REAL*8
       data dims / 4, 4, 2 /
       mxCreateNumericArray(3, dims,
     +                 mxClassIDFromClassName('double'), 0)
```

## See Also

`mxCreateDoubleMatrix`, `mxCreateNumericMatrix`, `mxCreateSparse`, `mxCreateString`

**Purpose**

Create numeric matrix and initialize data elements to 0

**Fortran Syntax**

```
integer*4 function mxCreateNumericMatrix(m, n, classid,
  ComplexFlag)
integer*4 m, n, classid, ComplexFlag
```

**Arguments**

`m`
The desired number of rows.

`n`
The desired number of columns.

`classid`
A numerical identifier that represents a particular MATLAB class. Use the function, `mxClassIDFromClassName`, to derive the `classid` value from a class name `character` array.

The `classid` tells MATLAB how you want the numerical array data to be represented in memory. For example, specifying the `int32` class causes each piece of numerical data in the `mxArray` to be represented as a 32-bit signed integer.

`mxCreateNumericMatrix` accepts any of the MATLAB signed numeric classes, shown to the left in the table below.

`ComplexFlag`
If the data you plan to put into the `mxArray` has no imaginary components, specify `0`. If the data has some imaginary components, specify `1`.

**Returns**

A pointer to the created `mxArray`, if successful. `mxCreateNumericMatrix` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateNumericMatrix` is unsuccessful in a MEX-file, the MEX-file prints an `Out of Memory` message, terminates, and control returns to the MATLAB prompt. If `mxCreateNumericMatrix` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateNumericMatrix` returns `0`.

**Description**

Call `mxCreateNumericMatrix` to create an two-dimensional `mxArray` in which all data elements have the numeric data type specified by `classid`. After creating the `mxArray`, `mxCreateNumericMatrix` initializes all its real data elements to 0. If `ComplexFlag` is set to `1`, `mxCreateNumericMatrix` also initializes all its imaginary data elements to 0. `mxCreateNumericMatrix` allocates dynamic memory to store the created mxArray. When you finish using the mxArray, call mxDestroyArray to destroy it.

The following table shows the Fortran data types that are equivalent to MATLAB classes. Use these as shown in the example below.

| MATLAB Class Name | Fortran Type |
|---|---|
| int8 | BYTE |
| int16 | INTEGER*2 |
| int32 | INTEGER*4 |
| single | REAL*4 |
| double | REAL*8 |
| single, with imaginary components | COMPLEX*8 |
| double, with imaginary components | COMPLEX*16 |

## Examples

To create a 4-by-3 matrix of REAL*4 elements having no imaginary components, use

```
C      Create 4x3 mxArray of REAL*4
       mxCreateNumericMatrix(4, 3,
     +               mxClassIDFromClassName('single'), 0)
```

## See Also

mxCreateDoubleMatrix, mxCreateNumericArray

**Purpose** Create scalar, double-precision array initialized to specified value

**Fortran Syntax**

```
integer*4 function mxCreateScalarDouble(value)
real*4 value
```

**Arguments**

`value`
The desired value to which you want to initialize the array.

**Returns** A pointer to the created `mxArray`, if successful. `mxCreateScalarDouble` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateScalarDouble` is unsuccessful in a MEX-file, the MEX-file prints an `Out of Memory` message, terminates, and control returns to the MATLAB prompt. If `mxCreateScalarDouble` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateScalarDouble` returns `0`.

**Description** Call `mxCreateScalarDouble` to create a scalar double `mxArray`. `mxCreateScalarDouble` is a convenience function that can be used in place of the following code.

```
pm = mxCreateDoubleMatrix(1, 1, 0)
mxCopyReal8ToPtr(value, mxGetPr(pm), 1)
```

When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

**See Also** `mxGetPr`, `mxCreateDoubleMatrix`

# mxCreateSparse

**Purpose** Create two-dimensional unpopulated sparse mxArray

**Fortran Syntax**

```
integer*4 function mxCreateSparse(m, n, nzmax, ComplexFlag)
integer*4 m, n, nzmax, ComplexFlag
```

**Arguments**

m
The desired number of rows.

n
The desired number of columns.

nzmax
The number of elements that mxCreateSparse should allocate to hold the pr, ir, and, if ComplexFlag = 1, pi arrays. Set the value of nzmax to be greater than or equal to the number of nonzero elements you plan to put into the mxArray, but make sure that nzmax is less than or equal to m*n.

ComplexFlag
Specify REAL = 0 if the data has no imaginary components; specify COMPLEX = 1 if the data has some imaginary components.

**Returns** An unpopulated, sparse double mxArray if successful, and 0 otherwise.

**Description** Call mxCreateSparse to create an unpopulated sparse double mxArray. The returned sparse mxArray contains no sparse information and cannot be passed as an argument to any MATLAB sparse functions. In order to make the returned sparse mxArray useful, you must initialize the pr, ir, jc, and (if it exists) pi array.

mxCreateSparse allocates space for

- A pr array of length nzmax.
- A pi array of length nzmax (but only if ComplexFlag is COMPLEX = 1).
- An ir array of length nzmax.
- A jc array of length n+1.

When you finish using the sparse mxArray, call mxDestroyArray to reclaim all its heap space.

**See Also** mxDestroyArray, mxSetNzmax, mxSetPr, mxSetIr, mxSetJc

**Purpose** Create 1-by-N character array initialized to specified string

**Fortran Syntax**

```
integer*4 function mxCreateString(str)
character*(*) str
```

**Arguments**

str
The string that is to serve as the mxArray's initial data.

**Returns** A character array initialized to str if successful, and 0 otherwise.

**Description** Use mxCreateString to create a character mxArray initialized to str. Many MATLAB functions (for example, strcmp and upper) require character mxArray inputs.

Free the character mxArray when you are finished using it. To free a character mxArray, call mxDestroyArray.

**Examples** See matdemo1.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also** mxDestroyArray

# mxCreateStructArray

## Purpose

Create unpopulated N-dimensional structure `mxArray`

## Fortran Syntax

```
integer*4 function mxCreateStructArray(ndim, dims, nfields,
  fieldnames)
integer*4 ndim, dims, nfields
character*(*) fieldnames(nfields)
```

## Arguments

`ndim`
Number of dimensions. If you set `ndim` to be less than 2, `mxCreateStructArray` creates a two-dimensional `mxArray`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims[1]` to `5` and `dims[2]` to `7` establishes a 5-by-7 `mxArray`. Typically, the `dims` array should have `ndim` elements.

`nfields`
The desired number of fields in each element.

`fieldnames`
The desired list of field names.

Structure field names must begin with a letter, and are case-sensitive. The rest of the name may contain letters, numerals, and underscore characters. Use the `namelengthmax` function to determine the maximum length of a field name.

## Returns

A pointer to the created structure `mxArray` if successful, and zero otherwise. The most likely cause of failure is insufficient heap space to hold the returned `mxArray`.

## Description

Call `mxCreateStructArray` to create an unpopulated structure `mxArray`. Each element of a structure `mxArray` contains the same number of fields (specified in `nfields`). Each field has a name; the list of names is specified in `fieldnames.`

Each field holds one `mxArray` pointer. `mxCreateStructArray` initializes each field to zero. Call `mxSetField` or `mxSetFieldByNumber` to place a non-zero `mxArray` pointer in a field.

When you finish using the returned structure `mxArray`, call `mxDestroyArray` to reclaim its space.

Any trailing singleton dimensions specified in the `dims` argument are automatically removed from the resulting array. For example, if `ndim` equals `5` and `dims` equals `[4 1 7 1 1]`, the resulting array is given the dimensions 4-by-1-by-7.

## See Also

`mxDestroyArray`, `mxCreateStructMatrix`, `mxIsStruct`, `mxAddField`, `mxSetField`, `mxGetField`, `mxRemoveField`, `namelengthmax`

# mxCreateStructMatrix

## Purpose

Create unpopulated two-dimensional structure `mxArray`

## Fortran Syntax

```
integer*4 function mxCreateStructMatrix(m, n, nfields, fieldnames)
integer*4 m, n, nfields
character*(*) fieldnames(nfields)
```

## Arguments

`m`
The desired number of rows. This must be a positive integer.

`n`
The desired number of columns. This must be a positive integer.

`nfields`
The desired number of fields in each element.

`fieldnames`
The desired list of field names.

Structure field names must begin with a letter, and are case-sensitive. The rest of the name may contain letters, numerals, and underscore characters. Use the `namelengthmax` function to determine the maximum length of a field name.

## Returns

A pointer to the created structure `mxArray` if successful, and `0` otherwise. The most likely cause of failure is insufficient heap space to hold the returned `mxArray`.

## Description

`mxCreateStructMatrix` and `mxCreateStructArray` are almost identical. The only difference is that `mxCreateStructMatrix` can only create two-dimensional `mxArrays`, while `mxCreateStructArray` can create `mxArrays` having two or more dimensions.

## See Also

`mxCreateStructArray`, `mxIsStruct`, `mxAddField`, `mxSetField`, `mxGetField`, `mxRemoveField`, `namelengthmax`

**Purpose** Free dynamic memory allocated by `mxCreate`

**Fortran Syntax**

```
subroutine mxDestroyArray(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to the `mxArray` that you want to free.

**Description**

`mxDestroyArray` deallocates the memory occupied by the specified `mxArray`. `mxDestroyArray` not only deallocates the memory occupied by the `mxArray`'s characteristics fields (such as `m` and `n`), but also deallocates all the `mxArray`'s associated data arrays (such as `pr`, `pi`, `ir`, and/or `jc`). You should not call `mxDestroyArray` on an `mxArray` you are returning on the left-hand side.

**See Also**

`mxCalloc`, `mxFree`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

# mxDuplicateArray

**Purpose** Make deep copy of array

**Fortran Syntax**

```
integer*4 function mxDuplicateArray(in)
integer*4 in
```

**Arguments**

`in`
Pointer to the `mxArray` that you want to copy.

**Returns** Pointer to a copy of the array.

**Description** `mxDuplicateArray` makes a deep copy of an array, and returns a pointer to the copy. A deep copy refers to a copy in which all levels of data are copied. For example, a deep copy of a cell array copies each cell, and the contents of the each cell (if any), and so on.

**Purpose** Free dynamic memory allocated by `mxCalloc`, `mxMalloc`, or `mxRealloc`

**Fortran Syntax**

```
subroutine mxFree(ptr)
integer*4 ptr
```

**Arguments**

`ptr`
Pointer to the beginning of any memory parcel allocated by `mxCalloc`, `mxMalloc`, or `mxRealloc`.

**Description**

`mxFree` deallocates heap space. `mxFree` frees memory using the MATLAB memory management facility. This ensures correct memory management in error and abort (**Ctrl+C**) conditions.

`mxFree` works differently in MEX-files than in stand-alone MATLAB applications. With MEX-files, `mxFree` returns to the heap any memory allocated using `mxCalloc`. If you do not free memory with this command, MATLAB frees it automatically on return from the MEX-file. In stand-alone MATLAB applications, you have to explicitly free memory, and MATLAB memory management is not used.

In a MEX-file, your use of `mxFree` depends on whether the specified memory parcel is persistent or nonpersistent. By default, memory parcels created by `mxCalloc` are nonpersistent.

The MATLAB memory management facility automatically frees all nonpersistent memory whenever a MEX-file completes. Thus, even if you do not call `mxFree`, MATLAB takes care of freeing the memory for you. Nevertheless, it is a good programming practice to deallocate memory just as soon as you are through using it. Doing so generally makes the entire system run more efficiently.

When a MEX-file completes, the MATLAB memory management facility does not free persistent memory parcels. Therefore, the only way to free a persistent memory parcel is to call `mxFree`. Typically, MEX-files call `mexAtExit` to register a clean-up handler. Then, the clean-up handler calls `mxFree`.

**See Also**

`mxCalloc`, `mxRealloc`, `mxDestroyArray`

# mxFreeMatrix (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxDestroyArray` instead.

**See Also** `mxCalloc`, `mxFree`

## Purpose

Get contents of cell

## Fortran Syntax

```
integer*4 function mxGetCell(pm, index)
integer*4 pm, index
```

## Arguments

`pm`
Pointer to a cell `mxArray`.

`index`
The number of elements in the cell `mxArray` between the first element and the desired one. See `mxCalcSingleSubscript` for details on calculating an index in a multidimensional cell array.

## Returns

A pointer to the `i`th cell `mxArray` if successful, and `0` otherwise. Causes of failure include:

- The indexed cell array element has not been populated.
- Specifying an array pointer, `pm`, that does not point to a cell `mxArray`.
- Specifying an `index` greater than the number of elements in the cell.
- Insufficient free heap space to hold the returned cell `mxArray`.

## Description

Call `mxGetCell` to get a pointer to the `mxArray` held in the indexed element of the cell `mxArray`.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

## See Also

`mxCreateCellArray`, `mxIsCell`, `mxSetCell`

# mxGetClassID

**Purpose** Get class identifier of `mxArray`

**Fortran Syntax**

```
integer*4 function mxGetClassID(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** A numeric identifier that represents the class (category) of the `mxArray` that `pm` points to.

**Description** Use `mxGetClassId` to determine the class of an `mxArray`. The class of an `mxArray` identifies the kind of data the `mxArray` is holding.

**See Also** `mxGetClassName`

**Purpose** Get `mxArray` class as character array

**Fortran Syntax**

```
character*(*) function mxGetClassName(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** The class (as a `character` array) of `mxArray`, `pm`.

**Description** Call `mxGetClassName` to determine the class of an `mxArray`. The class of an `mxArray` identifies the kind of data the `mxArray` is holding. For example, if `pm` points to a logical `mxArray`, then `mxGetClassName` returns `logical`.

**See Also** `mxGetClassID`

# mxGetData

**Purpose** Get pointer to data

**Fortran Syntax**

```
integer*4 function mxGetData(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** The address of the first element of the real data, on success. Returns `0` if there is no real data or if there is an error.

**Description** Call `mxGetData` to get a pointer to the real data in the `mxArray` that `pm` points to. To copy values from the pointer to Fortran, use one of the `mxCopyPtrTo*` functions in the manner shown here.

```
C      Get the data in mxArray, pm
       mxCopyPtrToReal8(mxGetData(pm), data,
     +                      mxGetNumberOfElements(pm))
```

`mxGetData` is equivalent to using `mxGetPr`.

**See Also** `mxGetImagData`, `mxSetData`, `mxSetImagData`, `mxCopyPtrToReal4`, `mxCopyPtrToReal8`, `mxGetPr`

**Purpose** Get pointer to dimensions array

**Fortran Syntax**

```
integer*4 function mxGetDimensions(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** A pointer to the first element in a dimension array. Each integer in the dimensions array represents the number of elements in a particular dimension.

**Description** Use `mxGetDimensions` to determine how many elements are in each dimension of the `mxArray` that `pm` points to. Call `mxGetNumberOfDimensions` to get the number of dimensions in the `mxArray`.

`mxGetDimensions` returns a pointer to the dimension array. To copy the values to Fortran, use `mxCopyPtrToInteger4` in the manner shown here.

```
C      Get dimensions of mxArray, pm
       mxCopyPtrToInteger4(mxGetDimensions(pm), dims,
     +                     mxGetNumberOfDimensions(pm))
```

**See Also** `mxGetNumberOfDimensions`

# mxGetElementSize

## Purpose

Get number of bytes required to store each data element

## Fortran Syntax

```
integer*4 function mxGetElementSize(pm)
integer*4 pm
```

## Arguments

`pm`
Pointer to an `mxArray`.

## Returns

The number of bytes required to store one element of the specified `mxArray`, if successful. Returns `0` on failure. The primary reason for failure is that `pm` points to an `mxArray` having an unrecognized class. If `pm` points to a cell `mxArray` or a structure `mxArray`, then `mxGetElementSize` returns the size of a pointer (not the size of all the elements in each cell or structure field).

## Description

Call `mxGetElementSize` to determine the number of bytes in each data element of the `mxArray`. For example, if the class of an `mxArray` is `int16`, then the `mxArray` stores each data element as a 16-bit (2 byte) signed integer. Thus, `mxGetElementSize` returns `2`.

## See Also

`mxGetM`, `mxGetN`

**Purpose** Get value of `eps`

**Fortran Syntax**

```
real*8 function mxGetEps
```

**Returns** The value of the MATLAB `eps` variable.

**Description** Call `mxGetEps` to return the value of the MATLAB `eps` variable. This variable holds the distance from 1.0 to the next largest floating-point number. As such, it is a measure of floating-point accuracy. The MATLAB `pinv` and `rank` functions use `eps` as a default tolerance.

**See Also** `mxGetInf`, `mxGetNaN`

# mxGetField

## Purpose

Get structure array field value, given field name and index

## Fortran Syntax

```
integer*4 function mxGetField(pm, index, fieldname)
integer*4 pm, index
character*(*) fieldname
```

## Arguments

`pm`
Pointer to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an `index` of `1`, the second element has an `index` of `2`, and the last element has an `index` of `N`, where `N` is the total number of elements in the structure `mxArray`.

`fieldname`
The name of the field whose value you want to extract.

## Returns

A pointer to the `mxArray` in the specified field at the specified `fieldname`, on success. Returns zero if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying a `pm` that does not point to a structure `mxArray`. To determine if `pm` points to a structure `mxArray`, call `mxIsStruct`.
- Specifying an out-of-range `index` to an element past the end of the `mxArray`. For example, given a structure `mxArray` that contains 10 elements, you cannot specify an `index` greater than 10.
- Specifying a nonexistent `fieldname`. Call `mxGetFieldNameByNumber` to get existing `field names`.
- Insufficient heap space to hold the returned `mxArray`.

## Description

Call `mxGetField` to get the value held in the specified element of the specified field.

`mxGetFieldByNumber` is similar to `mxGetField`. Both functions return the same value. The only difference is in the way you specify the field. `mxGetFieldByNumber` takes `fieldnumber` as its third argument, and `mxGetField` takes `fieldname` as its third argument.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxGetField(pm, index, 'fieldname')
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxGetFieldByNumber(pm, index, fieldnum)
```

where `index` is `1` if you have a one-by-one structure.

### See Also

`mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`, `mxSetFieldByNumber`

# mxGetFieldByNumber

**Purpose** Get structure array field value, given field number and index

**Fortran Syntax**

```
integer*4 function mxGetFieldByNumber(pm, index, fieldnumber)
integer*4 pm, index, fieldnumber
```

**Arguments**

`pm`
Pointer to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an `index` of `1`, the second element has an `index` of `2`, and the last element has an `index` of `N`, where `N` is the total number of elements in the structure `mxArray`.

`fieldnumber`
The position of the field whose value you want to extract. The first field within each element has a field number of `1`, the second field has a field number of `2`, and so on. The last field has a field number of `N`, where `N` is the number of fields.

**Returns**

A pointer to the `mxArray` in the specified field for the desired element, on success. Returns zero if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying a `pm` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to is a structure `mxArray`.
- Specifying an index < `1` or > the number of elements in the array.
- Specifying a nonexistent field number. Call `mxGetFieldNumber` to determine the field number that corresponds to a given field name.

**Description**

Call `mxGetFieldByNumber` to get the value held in the specified `fieldnumber` at the indexed element.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxGetField(pm, index, 'fieldname')
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxGetFieldByNumber(pm, index, fieldnum)
```

where `index` is `1` if you have a one-by-one structure.

**See Also**

`mxGetField`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

# mxGetFieldNameByNumber

**Purpose** Get structure array field name, given field number

**Fortran Syntax**

```
character*(*) function mxGetFieldNameByNumber(pm, fieldnumber)
integer*4 pm, fieldnumber
```

**Arguments**

`pm`
Pointer to a structure `mxArray`.

`fieldnumber`
The position of the desired field. For instance, to get the name of the first field, set `fieldnumber` to `1`; to get the name of the second field, set `fieldnumber` to `2`; and so on.

**Returns**

The `n`th field name, on success. Returns `0` on failure. Common causes of failure include:

- Specifying a `pm` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.
- Specifying a value of `fieldnumber` greater than the number of fields in the structure `mxArray`. (Remember that `fieldnumber 1` represents the first field, so `index N` represents the last field.)

**Description**

Call `mxGetFieldNameByNumber` to get the name of a field in the given structure `mxArray`. A typical use of `mxGetFieldNameByNumber` is to call it inside a loop to get the names of all the fields in a given `mxArray`.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number `1` represents the field `name`; field number `2` represents field `billing`; field number `3` represents field `test`. A field number other than `1`, `2`, or `3` causes `mxGetFieldNameByNumber` to return `0`.

**See Also**

`mxGetField`, `mxIsStruct`, `mxSetField`

**Purpose**

Get structure array field number, given field name

**Fortran Syntax**

```
integer*4 function mxGetFieldNumber(pm, fieldname)
integer*4 pm
character*(*) fieldname
```

**Arguments**

`pm`
Pointer to a structure `mxArray`.

`fieldname`
The name of a field in the structure `mxArray`.

**Returns**

The field number of the specified `fieldname`, on success. The first field has a field number of `1`, the second field has a field number of `2`, and so on. Returns `0` on failure. Common causes of failure include:

- Specifying a `pm` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.
- Specifying the `fieldname` of a nonexistent field.

**Description**

If you know the name of a field but do not know its field number, call `mxGetFieldNumber`. Conversely, if you know the field number but do not know its field name, call `mxGetFieldNameByNumber`.

For example, consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field `name` has a field number of `1`; the field `billing` has a field number of `2`; and the field `test` has a field number of `3`. If you call `mxGetFieldNumber` and specify a field name of anything other than `'name'`, `'billing'`, or `'test'`, then `mxGetFieldNumber` returns `0`.

Calling

```
mxGetField(pm, index, 'fieldname');
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname');
mxGetFieldByNumber(pm, index, fieldnum);
```

where `index` is `1` if you have a `1-by-1` structure.

**See Also**

`mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

## Purpose

Get pointer to imaginary data of `mxArray`

## Fortran Syntax

```
integer*4 function mxGetImagData(pm)
integer*4 pm
```

## Arguments

`pm`
Pointer to an `mxArray`.

## Returns

The address of the first element of the imaginary data, on success. Returns `0` if there is no imaginary data or if there is an error.

## Description

Call `mxGetImagData` to determine the starting address of the imaginary data in the `mxArray` that `pm` points to. To copy values from the pointer to Fortran, use one of the `mxCopyPtrToComplex*` functions in the manner shown here.

```
C      Get the real and imaginary data in mxArray, pm
       mxCopyPtrToComplex16(mxGetData(pm), mxGetImagData(pm),
     +              data, mxGetNumberOfElements(pm))
```

`mxGetImagData` is equivalent to using `mxGetPi`.

## See Also

`mxGetData`, `mxSetImagData`, `mxSetData`, `mxCopyPtrToComplex8`, `mxCopyPtrToComplex16`, `mxGetPi`

# mxGetInf

**Purpose** Get value of infinity

**Fortran Syntax** `real*8 function mxGetInf`

**Returns** The value of infinity on your system.

**Description** Call `mxGetInf` to return the value of the MATLAB internal `inf` variable. `inf` is a permanent variable representing IEEE arithmetic positive infinity. The value of `inf` is built into the system. You cannot modify it.

Operations that return infinity include:

- Division by 0. For example, 5/0 returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

**See Also** `mxGetEps`, `mxGetNaN`

**Purpose**

Get `ir` array

**Fortran Syntax**

```
integer*4 function mxGetIr(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to a sparse `mxArray`.

**Returns**

A pointer to the first element in the `ir` array if successful, and zero otherwise. Possible causes of failure include:

- Specifying a full (nonsparse) `mxArray`.
- An earlier call to `mxCreateSparse` failed.

**Description**

Use `mxGetIr` to obtain the starting address of the `ir` array. The `ir` array is an array of integers; the length of the `ir` array is typically `nzmax` values. For example, if `nzmax` equals 100, then the `ir` array should contain 100 integers.

Each value in an `ir` array indicates a row (offset by 1) at which a nonzero element can be found. (The `jc` array is an index that indirectly specifies a column where nonzero elements can be found.)

For details on the `ir` and `jc` arrays, see `mxSetIr` and `mxSetJc`.

**See Also**

`mxGetJc`, `mxGetNzmax`, `mxSetIr`, `mxSetJc`, `mxSetNzmax`

# mxGetJc

**Purpose** Get `jc` array

**Fortran Syntax**

```
integer*4 function mxGetJc(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to a sparse `mxArray`.

**Returns** A pointer to the first element in the `jc` array if successful, and zero otherwise. The most likely cause of failure is specifying a pointer that points to a full (nonsparse) `mxArray`.

**Description** Use `mxGetJc` to obtain the starting address of the `jc` array. The `jc` array is an integer array having `n+1` elements where `n` is the number of columns in the sparse `mxArray`. The values in the `jc` array indirectly indicate columns containing nonzero elements. For a detailed explanation of the `jc` array, see `mxSetJc`.

**See Also** `mxGetIr`, `mxSetIr`, `mxSetJc`

**Purpose** Get number of rows in mxArray

**Fortran Syntax**

```
integer*4 function mxGetM(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns** The number of rows in the mxArray to which pm points.

**Description** mxGetM returns the number of rows in the specified array.

**Examples** See matdemo2.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also** mxGetN, mxSetM, mxSetN

# mxGetN

**Purpose** Get number of columns in mxArray

**Fortran Syntax**

```
integer*4 function mxGetN(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns** The number of columns in the mxArray.

**Description** Call mxGetN to determine the number of columns in the specified mxArray.

If pm points to a sparse mxArray, mxGetN still returns the number of columns, not the number of occupied columns.

**Examples** See matdemo2.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also** mxGetM, mxSetM, mxSetN

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

# mxGetNaN

**Purpose** Get value of NaN (Not-a-Number)

**Fortran Syntax**

```
real*8 function mxGetNaN
```

**Returns** The value of NaN (Not-a-Number) on your system.

**Description** Call mxGetNaN to return the value of NaN for your system. NaN is the IEEE arithmetic representation for Not-a-Number. Certain mathematical operations return NaN as a result, for example:

- 0.0/0.0
- Inf-Inf

The value of Not-a-Number is built in to the system. You cannot modify it.

**See Also** mxGetEps, mxGetInf

**Purpose** Get number of dimensions in mxArray

**Fortran Syntax**

```
integer*4 function mxGetNumberOfDimensions(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns** The number of dimensions in the specified mxArray. The returned value is always 2 or greater.

**Description** Use mxGetNumberOfDimensions to determine how many dimensions are in the specified array. To determine how many elements are in each dimension, call mxGetDimensions.

**See Also** mxSetM, mxSetN, mxGetDimensions

# mxGetNumberOfElements

**Purpose** Get number of elements in mxArray

**Fortran Syntax**

```
integer*4 function mxGetNumberOfElements(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns** Number of elements in the specified mxArray.

**Description** mxGetNumberOfElements tells you how many elements an mxArray has. For example, if the dimensions of an array are 3-by-5-by-10, then mxGetNumberOfElements will return the number 150.

**See Also** mxGetDimensions, mxGetM, mxGetN, mxGetClassName

**Purpose** Get number of fields in structure `mxArray`

**Fortran Syntax**

```
integer*4 function mxGetNumberOfFields(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to a structure `mxArray`.

**Returns** The number of fields, on success. Returns `0` on failure of if no fields exist. The most common cause of failure is that `pm` is not a structure `mxArray`. Call `mxIsStruct` to determine if `pm` is a structure.

**Description** Call `mxGetNumberOfFields` to determine how many fields are in the specified structure `mxArray`.

Once you know the number of fields in a structure, it is easy to loop through every field to set or to get field values.

**See Also** `mxGetField`, `mxIsStruct`, `mxSetField`

# mxGetNzmax

**Purpose**

Get number of elements in `ir`, `pr`, and `pi` arrays

**Fortran Syntax**

```
integer*4 function mxGetNzmax(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to a sparse `mxArray`.

**Returns**

The number of elements allocated to hold nonzero entries in the specified sparse `mxArray`, on success. Returns an indeterminate value on error. The most likely cause of failure is that `pm` points to a full (nonsparse) `mxArray`.

**Description**

Use `mxGetNzmax` to get the value of the `nzmax` field. The `nzmax` field holds an integer value that signifies the number of elements in the `ir`, `pr`, and, if it exists, the `pi` arrays. The value of `nzmax` is always greater than or equal to the number of nonzero elements in a sparse `mxArray`. In addition, the value of `nzmax` is always less than or equal to the number of rows times the number of columns.

As you adjust the number of nonzero elements in a sparse `mxArray`, MATLAB often adjusts the value of the `nzmax` field. MATLAB adjusts `nzmax` in order to reduce the number of costly reallocations and in order to optimize its use of heap space.

**See Also**

`mxSetNzmax`

**Purpose** Get imaginary data elements of `mxArray`

**Fortran Syntax**

```
integer*4 function mxGetPi(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** The imaginary data elements of the specified `mxArray`, on success. Returns 0 if there is no imaginary data or if there is an error.

**Description** Use `mxGetPi` to determine the starting address of the imaginary data in the `mxArray` that `pm` points to.

See the description for `mxGetImagData`, which is an equivalent function to `mxGetPi`.

**See Also** `mxGetPr`, `mxSetPi`, `mxSetPr`, `mxGetImagData`

# mxGetPr

**Purpose** Get real data elements of `mxArray`

**Fortran Syntax**

```
integer*4 function mxGetPr(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** The address of the first element of the real data. Returns 0 if there is no real data.

**Description** Use `mxGetPr` to determine the starting address of the real data in the `mxArray` that `pm` points to.

See the description for `mxGetData`, which is an equivalent function to `mxGetPr`.

**Examples** See `matdemo1.f` and `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also** `mxGetPi`, `mxSetPr`, `mxSetPi`, `mxGetData`

**Purpose**

Get real component of first data element in `mxArray`

**Fortran Syntax**

```
real*8 function mxGetScalar(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns**

The value of the first real (nonimaginary) element of the `mxArray`. If `pm` points to a sparse `mxArray`, `mxGetScalar` returns the value of the first nonzero real element in the `mxArray`.

If `pm` points to an empty `mxArray`, `mxGetScalar` returns an indeterminate value.

**Description**

Call `mxGetScalar` to get the value of the first real (nonimaginary) element of the `mxArray`.

In most cases, you call `mxGetScalar` when `pm` points to an `mxArray` containing only one element (a scalar). However, `pm` can point to an `mxArray` containing many elements. If `pm` points to an `mxArray` containing multiple elements, `mxGetScalar` returns the value of the first real element. If `pm` points to a two-dimensional `mxArray`, `mxGetScalar` returns the value of the `(1,1)` element.

**See Also**

`mxGetM`, `mxGetN`

# mxGetString

**Purpose** Create `character` array from `mxArray`

**Fortran Syntax**

```
integer*4 function mxGetString(pm, str, strlen)
integer*4 pm, strlen
character*(*) str
```

**Arguments**

`pm`
Pointer to an `mxArray`.

`str`
Fortran `character` array.

`strlen`
Number of characters to retrieve from the `mxArray`.

**Returns** 0 on success, and 1 otherwise.

**Description**

Call `mxGetString` to copy a `character` array from an `mxArray`. `mxGetString` copies and converts the `character` array from the `mxArray` `pm` into the `character` array `str`. Storage space for `character` array `str` must be allocated previously.

Only up to `strlen` characters are copied, so ordinarily, `strlen` is set to the dimension of the `character` array to prevent writing past the end of the array. Check the length of the `character` array in advance using `mxGetM` and `mxGetN`. If the `character` array contains several rows, they are copied, one column at a time, into one long `character` array.

**See Also** `mxCalloc`

**Purpose** Determine if input is cell mxArray

**Fortran Syntax**

```
integer*4 function mxIsCell(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an array.

**Returns** Logical 1 (true) if pm points to an array of the MATLAB cell class, and logical 0 (false) otherwise.

**Description** Use mxIsCell to determine if the specified mxArray is a cell array.

Calling mxIsCell is equivalent to calling

```
mxGetClassName(pm) .eq. 'cell'
```

---

**Note** mxIsCell does not answer the question, "Is this mxArray a cell of a cell array?". An individual cell of a cell array can be of any type.

---

**See Also** mxIsClass

# mxIsChar

**Purpose** Determine if input is character mxArray

**Fortran Syntax**

```
integer*4 function mxIsChar(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns** Logical 1 (true) if pm points to an array of the MATLAB char class, and logical 0 (false) otherwise.

**Description** Use mxIsChar to determine if the specified array is a character mxArray.

Calling mxIsChar is equivalent to calling

```
mxGetClassName(pm) .eq. 'char'
```

**See Also** mxIsClass, mxGetClassID

**Purpose**

Determine if `mxArray` is member of specified class

**Fortran Syntax**

```
integer*4 function mxIsClass(pm, classname)
integer*4 pm
character*(*) classname
```

**Arguments**

`pm`
Pointer to an array.

*`classname`*
A `character` array specifying the class name you are testing for. You can specify any one of the following predefined constants.

| | | | |
|---|---|---|---|
| `cell` | `char` | `double` | `function_handle` |
| `int8` | `int16` | `int32` | `logical` |
| `object` | `single` | `struct` | `uint8` |
| `uint16` | `uint32` | `<class_name>` | `unknown` |

In the table, `<class_name>` represents the name of a specific MATLAB custom object. You can also specify one of your own class names.

**Returns**

Logical `1` (`true`) if `pm` points to an array having category *`classname`*, and logical `0` (`false`) otherwise.

**Description**

Each `mxArray` is tagged as being a certain type. Call `mxIsClass` to determine if the specified `mxArray` has this type.

**Examples**

```
mxIsClass(pm, 'double')
```

is equivalent to calling either one of the following

```
mxIsDouble(pm)

mxGetClassName(pm) .eq. 'double'
```

It is more efficient to use the `mxIsDouble` form.

**See Also**

`mxIsEmpty`, `mxGetClassID`

# mxIsComplex

**Purpose**

Determine if `mxArray` is complex

**Fortran Syntax**

```
integer*4 function mxIsComplex(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns**

1 if complex, and 0 otherwise.

**Description**

Use `mxIsComplex` to determine whether or not an imaginary part is allocated for an `mxArray`. The imaginary pointer `pi` is 0 if an `mxArray` is purely real and does not have any imaginary data. If an `mxArray` is complex, `pi` points to an array of numbers.

**See Also**

mxIsNumeric

**Purpose** Determine if `mxArray` is of type `double`

**Fortran Syntax**

```
integer*4 function mxIsDouble(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** Logical `1` (`true`) if `mxArray` is of type `double`; and logical `0` (`false`) otherwise. If `mxIsDouble` returns 0, the array has no Fortran access functions and your Fortran program cannot use it.

**Description** Call `mxIsDouble` to determine whether or not the specified `mxArray` represents its real and imaginary data as double-precision, floating-point numbers.

Older versions of MATLAB store all `mxArray` data as double-precision, floating-point numbers. However, starting with MATLAB 5, MATLAB can store real and imaginary data in a variety of numerical formats.

Calling `mxIsDouble` is equivalent to calling

```
mxGetClassName(pm) .eq. 'double'
```

# mxIsEmpty

**Purpose**
Determine if `mxArray` is empty

**Fortran Syntax**

```
integer*4 function mxIsEmpty(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an array.

**Returns**
Logical `1` (`true`) if the `mxArray` is empty, and logical `0` (`false`) otherwise.

**Description**
Use `mxIsEmpty` to determine if an `mxArray` contains no data. An `mxArray` is empty if the size of any of its dimensions is 0.

Note that `mxIsEmpty` is not the opposite of `mxIsFull`.

**See Also**
`mxIsClass`

**Purpose**
Determine if input is finite

**Fortran Syntax**
```
integer*4 function mxIsFinite(value)
real*8 value
```

**Arguments**
`value`
The double-precision, floating-point number that you are testing.

**Returns**
Logical `1` (`true`) if `value` is finite, and logical `0` (`false`) otherwise.

**Description**
Call `mxIsFinite` to determine whether or not `value` is finite. A number is finite if it is greater than `-Inf` and less than `Inf`.

**See Also**
`mxIsInf`, `mxIsNaN`

# mxIsFromGlobalWS

**Purpose**

Determine if `mxArray` originated from MATLAB global workspace

**Fortran Syntax**

```
integer*4 function mxIsFromGlobalWS(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns**

Logical `1` (`true`) if the array originated from the global workspace, and logical `0` (`false`) otherwise.

**Description**

Use `mxIsFromGlobalWS` with stand-alone MAT programs to determine if an array was a global variable when it was saved.

**See Also**

`mexIsGlobal`

## Compatibility

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
if (mxIsSparse(prhs(1)) .eq. 0)
```

instead of

```
if (mxIsFull(prhs(1)) .eq. 1)
```

## See Also

`mxIsSparse`

# mxIsInf

**Purpose**

Determine if input is infinite

**Fortran Syntax**

```
integer*4 function mxIsInf(value)
integer*4 value
```

**Arguments**

`value`
The double-precision, floating-point number that you are testing.

**Returns**

Logical `1` (`true`) if value is infinite, and logical `0` (`false`) otherwise.

**Description**

Call `mxIsInf` to determine whether or not `value` is equal to infinity or minus infinity. MATLAB stores the value of infinity in a permanent variable named `Inf`, which represents IEEE arithmetic positive infinity. The value of the variable, `Inf`, is built into the system. You cannot modify it.

Operations that return infinity include:

- Division by 0. For example, `5/0` returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

**See Also**

`mxIsFinite`, `mxIsNaN`

**Purpose**

Determine if input is mxArray of signed 8-bit integers

**Fortran Syntax**

```
integer*4 function mxIsInt8(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns**

Logical 1 (true) if the array stores its data as signed 8-bit integers, and logical 0 (false) otherwise.

**Description**

Use mxIsInt8 to determine whether or not the specified array represents its real and imaginary data as 8-bit signed integers.

Calling mxIsInt8 is equivalent to calling

```
mxGetClassName(pm) .eq. 'int8'
```

**See Also**

mxIsClass, mxGetClassID, mxIsInt16, mxIsInt32, mxIsInt64, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

# mxIsInt16

## Purpose

Determine if input is `mxArray` of signed 16-bit integers

## Fortran Syntax

```
integer*4 function mxIsInt16(pm)
integer*4 pm
```

## Arguments

`pm`
Pointer to an `mxArray`.

## Returns

Logical `1` (`true`) if the array stores its data as signed 16-bit integers, and logical `0` (`false`) otherwise.

## Description

Use `mxIsInt16` to determine whether or not the specified array represents its real and imaginary data as 16-bit signed integers.

Calling `mxIsInt16` is equivalent to calling

```
mxGetClassName(pm) == 'int16'
```

## See Also

`mxIsClass`, `mxGetClassID`, `mxIsInt8`, `mxIsInt32`, `mxIsInt64`, `mxIsUint8`, `mxIsUint16`, `mxIsUint32`, `mxIsUint64`

**Purpose**
Determine if input is `mxArray` of signed 32-bit integers

**Fortran Syntax**

```
integer*4 function mxIsInt32(pm)
integer*4 pm
```

**Arguments**

`m`
Pointer to an `mxArray`.

**Returns**
Logical `1` (`true`) if the array stores its data as signed 32-bit integers, and logical `0` (`false`) otherwise.

**Description**
Use `mxIsInt32` to determine whether or not the specified array represents its real and imaginary data as 32-bit signed integers.

Calling `mxIsInt32` is equivalent to calling

```
mxGetClassName(pm) == 'int32'
```

**See Also**
`mxIsClass`, `mxGetClassID`, `mxIsInt8`, `mxIsInt16`, `mxIsInt64`, `mxIsUint8`, `mxIsUint16`, `mxIsUint32`, `mxIsUint64`

# mxIsInt64

**Purpose**

Determine if input is mxArray of signed 64-bit integers

**Fortran Syntax**

```
integer*4 function mxIsInt64(pm)
integer*4 pm
```

**Arguments**

m
Pointer to an mxArray.

**Returns**

Logical 1 (true) if the array stores its data as signed 64-bit integers, and logical 0 (false) otherwise.

**Description**

Use mxIsInt64 to determine whether or not the specified array represents its real and imaginary data as 64-bit signed integers.

Calling mxIsInt64 is equivalent to calling

```
mxGetClassName(pm) == 'int64'
```

**See Also**

mxIsClass, mxGetClassID, mxIsInt8, mxIsInt16, mxIsInt32, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

**Purpose**

Determine if `mxArray` is Boolean

**Fortran Syntax**

```
integer*4 function mxIsLogical(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns**

Logical `1` (`true`) if `pm` points to a logical `mxArray`, and logical `0` (`false`) otherwise.

**Description**

Use `mxIsLogical` to determine whether MATLAB treats the data in the `mxArray` as Boolean (logical). If an `mxArray` is logical, then MATLAB treats all zeros as meaning `false` and all nonzero values as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

**See Also**

`mxIsClass`, `mxSetLogical (Obsolete)`, `logical`

# mxIsNaN

**Purpose**

Determine if value is `NaN` (Not-a-Number)

**Fortran Syntax**

```
integer*4 function mxIsNaN(value)
integer*4 value
```

**Arguments**

`value`
The double-precision, floating-point number that you are testing.

**Returns**

Logical `1` (`true`) if `value` is `NaN` (Not-a-Number), and logical `0` (`false`) otherwise.

**Description**

Call `mxIsNaN` to determine whether or not `value` is `NaN`. `NaN` is the IEEE arithmetic representation for Not-a-Number. A `NaN` is obtained as a result of mathematically undefined operations such as:

- `0.0/0.0`
- `Inf-Inf`

The system understands a family of bit patterns as representing `NaN`. In other words, `NaN` is not a single value, rather it is a family of numbers that MATLAB (and other IEEE-compliant applications) uses to represent an error condition or missing data.

**See Also**

`mxIsFinite`, `mxIsInf`

**Purpose**

Determine if `mxArray` contains numeric data

**Fortran Syntax**

```
integer*4 function mxIsNumeric(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns**

1 if the `mxArray` contains numeric data, and 0 otherwise.

**Description**

Call `mxIsNumeric` to inquire whether or not the `mxArray` contains numeric data, such as data of class `double` or `uint16`. Note that `logical` data is not numeric.

**Examples**

See `matdemo1.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

**See Also**

`mxIsString (Obsolete)`

# mxIsSingle

## Purpose

Determine if input is single-precision, floating-point mxArray

## Fortran Syntax

```
integer*4 function mxIsSingle(pm)
integer*4 pm
```

## Arguments

pm
Pointer to an mxArray.

## Returns

Logical 1 (true) if the array stores its data as single-precision, floating-point numbers, and logical 0 (false) otherwise.

## Description

Use mxIsSingle to determine whether or not the specified array represents its real and imaginary data as single-precision, floating-point numbers.

Calling mxIsSingle is equivalent to calling

```
mxGetClassName(pm) .eq. 'single'
```

## See Also

mxIsClass, mxGetClassID

**Purpose**

Determine if mxArray is sparse

**Fortran Syntax**

```
integer*4 function mxIsSparse(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns**

1 if the mxArray is sparse, and 0 otherwise.

**Description**

Use mxIsSparse to determine if an mxArray is stored in sparse form. Many routines (for example, mxGetIr and mxGetJc) require a sparse mxArray as input.

There are no corresponding set routines. Use mxCreateSparse to create sparse mxArrays.

**See Also**

mxGetIr, mxGetJc, mxCreateSparse

# mxIsString (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsChar` instead.

**See Also** `mxCreateString`, `mxGetString`

**Purpose**

Determine if input is structure mxArray

**Fortran Syntax**

```
integer*4 function mxIsStruct(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns**

Logical 1 (true) if pm points to a structure array; and logical 0 (false) otherwise.

**Description**

Use mxIsStruct to determine if pm points to a structure mxArray. Many routines (for example, mxGetFieldName and mxSetField) require a structure mxArray as an argument.

**See Also**

mxCreateStructArray, mxCreateStructMatrix, mxGetNumberOfFields, mxGetField, mxSetField

# mxIsUint8

**Purpose**

Determine if input is mxArray of unsigned 8-bit integers

**Fortran Syntax**

```
integer*4 function mxIsInt8(pm)
integer*4 pm
```

**Arguments**

m
Pointer to an mxArray.

**Returns**

Logical 1 (true) if the mxArray stores its data as unsigned 8-bit integers, and logical 0 (false) otherwise.

**Description**

Use mxIsUint8 to determine whether or not the specified mxArray represents its real and imaginary data as 8-bit unsigned integers.

Calling mxIsUint8 is equivalent to calling

```
mxGetClassName(pm) == 'uint8'
```

**See Also**

mxIsClass, mxGetClassID, mxIsUint16, mxIsUint32, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

**Purpose** Determine if input is mxArray of unsigned 16-bit integers

**Fortran Syntax**

```
integer*4 function mxIsUint16(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray.

**Returns** Logical 1 (true) if the mxArray stores its data as unsigned 16-bit integers, and logical 0 (false) otherwise.

**Description** Use mxIsUint16 to determine whether or not the specified mxArray represents its real and imaginary data as 16-bit unsigned integers.

Calling mxIsUint16 is equivalent to calling

```
mxGetClassName(pm) == 'uint16'
```

**See Also** mxIsClass, mxGetClassID, mxIsUint8, mxIsUint32, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

# mxIsUint32

## Purpose

Determine if input is `mxArray` of unsigned 32-bit integers

## Fortran Syntax

```
integer*4 function mxIsUint32(pm)
integer*4 pm
```

## Arguments

`pm`
Pointer to an `mxArray`.

## Returns

Logical `1` (`true`) if the `mxArray` stores its data as unsigned 32-bit integers, and logical `0` (`false`) otherwise.

## Description

Use `mxIsUint32` to determine whether or not the specified `mxArray` represents its real and imaginary data as 32-bit unsigned integers.

Calling `mxIsUint32` is equivalent to calling

```
mxGetClassName(pm) == 'uint32'
```

## See Also

`mxIsClass`, `mxGetClassID`, `mxIsUint8`, `mxIsUint16`, `mxIsUint64`, `mxIsInt8`, `mxIsInt16`, `mxIsInt32`, `mxIsInt64`

**Purpose** Determine if input is `mxArray` of unsigned 64-bit integers

**Fortran Syntax**

```
integer*4 function mxIsUint64(pm)
integer*4 pm
```

**Arguments**

`pm`
Pointer to an `mxArray`.

**Returns** Logical `1` (`true`) if the `mxArray` stores its data as unsigned 64-bit integers, and logical `0` (`false`) otherwise.

**Description** Use `mxIsUint64` to determine whether or not the specified `mxArray` represents its real and imaginary data as 64-bit unsigned integers.

Calling `mxIsUint64` is equivalent to calling

```
mxGetClassName(pm) == 'uint64'
```

**See Also** `mxIsClass`, `mxGetClassID`, `mxIsUint8`, `mxIsUint16`, `mxIsUint32`, `mxIsInt8`, `mxIsInt16`, `mxIsInt32`, `mxIsInt64`

# mxMalloc

**Purpose**

Allocate dynamic memory using MATLAB memory manager

**Fortran Syntax**

```
integer*4 function mxMalloc(n)
integer*4 n
```

**Arguments**

`n`
Number of bytes to allocate.

**Returns**

A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (non-MEX-file) application, `mxMalloc` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxMalloc` is unsuccessful when there is insufficient free heap space.

**Description**

Use `mxMalloc` to allocate dynamic memory using the MATLAB memory management facility.

MATLAB maintains a list of all memory allocated by `mxMalloc`. MATLAB automatically frees (deallocates) all of a MEX-file's memory when the MEX-file completes and control returns to the MATLAB prompt.

If you want the memory to persist after a MEX-file completes, call `mexMakeMemoryPersistent` after calling `mxMalloc`. If you write a MEX-file with persistent memory, be sure to register a `mexAtExit` function to free allocated memory in the event your MEX-file is cleared.

When you finish using the memory allocated by `mxMalloc`, call `mxFree`. `mxFree` deallocates the memory.

Note that `mxMalloc` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxMalloc` automatically:

- Allocates enough contiguous heap space to hold `n` bytes.
- Registers the returned heap space with the MATLAB memory management facility.

**See Also**

`mxCalloc`, `mxRealloc`, `mxFree`, `mxDestroyArray`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

**Purpose**

Reallocate memory

**Fortran Syntax**

```
integer*4 function mxRealloc(ptr, size)
integer*4 ptr, size
```

**Arguments**

`ptr`
Pointer to a block of memory allocated by `mxCalloc`, `mxMalloc`, or `mxRealloc`.

`size`
New size of allocated memory, in bytes.

**Returns**

A pointer to the reallocated block of memory, or `0` if `size` is 0. In a stand-alone (non-MEX-file) application, if not enough memory is available to expand the block to the given size, `mxRealloc` returns 0. In a MEX-file, if not enough memory is available to expand the block to the given size, the MEX-file terminates and control returns to the MATLAB prompt.

**Description**

`mxRealloc` changes the size of a memory block that has been allocated with `mxCalloc`, `mxMalloc`, or `mxRealloc`.

If `size` is 0 and `ptr` is not `0`, `mxRealloc` frees the memory pointed to by `ptr` and returns `0`.

If `size` is greater than 0 and `ptr` is `0`, `mxRealloc` behaves like `mxMalloc`, allocating a new block of memory of `size` bytes and returning a pointer to the new block.

Otherwise, `mxRealloc` changes the size of the memory block pointed to by `ptr` to `size` bytes. The contents of the reallocated memory are unchanged up to the smaller of the new and old sizes. The reallocated memory may be in a different location from the original memory, so the returned pointer can be different from `ptr`. If the memory location changes, `mxRealloc` frees the original memory block pointed to by `ptr`.

In a stand-alone (non-MEX-file) application, if not enough memory is available to expand the block to the given size, `mxRealloc` returns `0` and leaves the original memory block unchanged. You must use `mxFree` to free the original memory block.

MATLAB maintains a list of all memory allocated by `mxRealloc`. By default, in a MEX-file, `mxRealloc` generates nonpersistent `mxRealloc` data. The memory management facility automatically deallocates the memory as soon as the MEX-file ends.

If you want the memory to persist after a MEX-file completes, call `mexMakeMemoryPersistent` after calling `mxRealloc`. If you write a MEX-file with persistent memory, be sure to register a `mexAtExit` function to free allocated memory when your MEX-file is cleared.

When you finish using the memory allocated by `mxRealloc`, call `mxFree`. `mxFree` deallocates the memory.

**See Also**

`mxCalloc`, `mxFree`, `mxMalloc`

**Purpose**

Remove field from structure `mxArray`

**Fortran Syntax**

```
subroutine mxRemoveField(pm, fieldnumber)
integer*4 pm, fieldnumber
```

**Arguments**

`pm`
Pointer to a structure `mxArray`.

`fieldnumber`
The number of the field you want to remove. For instance, to remove the first field, set `fieldnumber` to `1`; to remove the second field, set `fieldnumber` to `2`; and so on.

**Description**

Call `mxRemoveField` to remove a field from a structure array. If the field does not exist, nothing happens. This function does not destroy the field values. Use `mxDestroyArray` to destroy the actual field values.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number `1` represents the field `name`; field number `2` represents field `billing`; field number `3` represents field `test`.

**See Also**

`mxAddField`, `mxDestroyArray`, `mxGetFieldByNumber`

# mxSetCell

## Purpose

Set value of one cell of cell mxArray

## Fortran Syntax

```
subroutine mxSetCell(pm, index, value)
integer*4 pm, index, value
```

## Arguments

pm
Pointer to a cell mxArray.

index
Index from the beginning of the mxArray. Specify the number of elements between the first cell of the mxArray and the cell you want to set. The easiest way to calculate the index in a multidimensional cell array is to call mxCalcSingleSubscript.

value
The new value of the cell. You can put any kind of mxArray into a cell. In fact, you can even put another cell mxArray into a cell. Use one of the mxCreate* functions to create the value mxArray.

## Description

Call mxSetCell to put the designated value into a particular cell of a cell mxArray.

---

**Note** Inputs to a MEX-file are constant read-only mxArrays and should not be modified. Using mxSetCell* or mxSetField* to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call mxFree on the pointer returned by mxGetCell before you call mxSetCell.

## See Also

mxCreateCellArray, mxCreateCellMatrix, mxGetCell, mxIsCell, mxFree

**Purpose** Set pointer to data

**Fortran Syntax**

```
subroutine mxSetData(pm, pr)
integer*4 pm, pr
```

**Arguments**

`pm`
Pointer to an `mxArray`.

`pr`
Pointer to the first element of an array. Each element in the array contains the real component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory.

**Description** Use `mxSetData` to set the real data of the specified `mxArray`.

All `mxCreate*` calls allocate heap space to hold real data. Therefore, you do not ordinarily use `mxSetData` to initialize the real elements of a freshly created `mxArray`. Rather, you call `mxSetData` to replace the initial real values with new ones.

`mxSetData` is equivalent to using `mxSetPr`.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetData` before you call `mxSetData`.

**See Also** `mxSetImagData`, `mxGetData`, `mxGetImagData`, `mxSetPr`, `mxFree`

# mxSetDimensions

**Purpose**

Modify number of dimensions and size of each dimension

**Fortran Syntax**

```
integer*4 function mxSetDimensions(pm, dims, ndim)
integer*4 pm, dims, ndim
```

**Arguments**

`pm`
Pointer to an `mxArray`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims(1)` to `5` and `dims(2)` to `7` establishes a 5-by-7 `mxArray`. In most cases, there should be `ndim` elements in the `dims` array.

`ndim`
The desired number of dimensions.

**Returns**

`0` on success, and `1` on failure. `mxSetDimensions` allocates heap space to hold the input size array. So it is possible (though extremely unlikely) that increasing the number of dimensions can cause the system to run out of heap space.

**Description**

Call `mxSetDimensions` to reshape an existing `mxArray`. `mxSetDimensions` is similar to `mxSetM` and `mxSetN`; however, `mxSetDimensions` provides greater control for reshaping `mxArrays` that have more than two-dimensions.

`mxSetDimensions` does not allocate or deallocate any space for the `pr` or `pi` array. Consequently, if your call to `mxSetDimensions` increases the number of elements in the `mxArray`, then you must enlarge the `pr` (and `pi`, if it exists) array accordingly.

If your call to `mxSetDimensions` reduces the number of elements in the `mxArray`, then you can optionally reduce the size of the `pr` and `pi` arrays using `mxRealloc`.

**See Also**

`mxGetNumberOfDimensions`, `mxSetM`, `mxSetN`

**Purpose**

Set structure array field value, given field name and index

**Fortran Syntax**

```
subroutine mxSetField(pm, index, fieldname, value)
integer*4 pm, index, value
character*(*) fieldname
```

**Arguments**

`pm`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of `1`, the second element has an index of `2`, and the last element has an index of `N`, where `N` is the total number of elements in the structure `mxArray`.

`fieldname`
The name of the field whose value you are assigning. Call `mxGetFieldNameByNumber` to determine existing field names.

`value`
Pointer to the `mxArray` you are assigning. Use one of the `mxCreate*` functions to create the `value` `mxArray`.

**Description**

Use `mxSetField` to assign a `value` to the specified element of the specified field. `mxSetField` is almost identical to `mxSetFieldByNumber`; however, the former takes a field name as its third argument, and the latter takes a field number as its third argument.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxSetField(pm, index, 'fieldname', newvalue)
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxSetFieldByNumber(pm, index, fieldnum, newvalue)
```

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetField` before you call `mxSetField`.

## See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetFieldByNumber`, `mxFree`

**Purpose**

Set structure array field value, given field number and index

**Fortran Syntax**

```
subroutine mxSetFieldByNumber(pm, index, fieldnumber, value)
integer*4 pm, index, fieldnumber, value
```

**Arguments**

`pm`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of `1`, the second element has an index of `2`, and the last element has an index of `N`, where `N` is the total number of elements in the structure `mxArray`.

`fieldnumber`
The position of the field whose value you want to extract. The first field within each element has a `fieldnumber` of `1`, the second field has a `fieldnumber` of `2`, and so on. The last field has a `fieldnumber` of `N`, where `N` is the number of fields.

`value`
The value you are assigning. Use one of the `mxCreate*` functions to create the `value` `mxArray`.

**Description**

Use `mxSetFieldByNumber` to assign a `value` to the specified element of the specified field. `mxSetFieldByNumber` is almost identical to `mxSetField`; however, the former takes a field number as its third argument, and the latter takes a field name as its third argument.

---

**Note** Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

---

Calling

```
mxSetField(pm, index, 'fieldname', newvalue)
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxSetFieldByNumber(pm, index, fieldnum, newvalue)
```

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetFieldByNumber` before you call `mxSetFieldByNumber`.

### See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`, `mxFree`

**Purpose** Set imaginary data pointer for mxArray

**Fortran Syntax**

```
subroutine mxSetImagData(pm, pi)
integer*4 pm, pi
```

**Arguments**

pm
Pointer to an mxArray.

pi
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call mxCalloc to allocate this dynamic memory. If pi points to static memory, memory errors will result when the array is destroyed.

**Description** Use mxSetImagData to set the imaginary data of the specified mxArray.

Most mxCreate* functions optionally allocate heap space to hold imaginary data. If you tell an mxCreate* function to allocate heap space (for example, by setting the ComplexFlag to COMPLEX = 1 or by setting pi to a nonzero value), then you do not ordinarily use mxSetImagData to initialize the created mxArray's imaginary elements. Rather, you call mxSetImagData to replace the initial imaginary values with new ones.

mxSetImagData is equivalent to using mxSetPi.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call mxFree on the pointer returned by mxGetImagData before you call mxSetImagData.

**See Also** mxSetData, mxGetImagData, mxGetData, mxSetPi, mxFree

# mxSetIr

**Purpose** Set `ir` array of sparse `mxArray`

**Fortran Syntax**

```
subroutine mxSetIr(pm, ir)
integer*4 pm,ir
```

**Arguments**

`pm`
Pointer to a sparse `mxArray`.

`ir`
Pointer to the `ir` array. The `ir` array must be sorted in column-major order.

**Description**

Use `mxSetIr` to specify the `ir` array of a sparse `mxArray`. The `ir` array is an array of integers; the length of the `ir` array should equal the value of `nzmax`.

Each element in the `ir` array indicates a row (offset by 1) at which a nonzero element can be found. (The `jc` array is an index that indirectly specifies a column where nonzero elements can be found. See `mxSetJc` for more details on `jc`.)

The `ir` array must be in column-major order. That means that the `ir` array must define the row positions in column 1 (if any) first, then the row positions in column 2 (if any) second, and so on through column N. Within each column, row position 1 must appear prior to row position 2, and so on.

`mxSetIr` does not sort the `ir` array for you; you must specify an `ir` array that is already sorted.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetIr` before you call `mxSetIr`.

**See Also**

`mxCreateSparse`, `mxGetIr`, `mxGetJc`, `mxSetJc`, `mxFree`

**Purpose**

Set `jc` array of sparse `mxArray`

**Fortran Syntax**

```
subroutine mxSetJc(pm, jc)
integer*4 pm, jc
```

**Arguments**

`pm`
Pointer to a sparse `mxArray`.

`jc`
Pointer to the `jc` array.

**Description**

Use `mxSetJc` to specify a new `jc` array for a sparse `mxArray`. The `jc` array is an integer array having `n+1` elements where `n` is the number of columns in the sparse `mxArray`.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetJc` before you call `mxSetJc`.

**See Also**

`mxGetIr`, `mxGetJc`, `mxSetIr`, `mxFree`

# mxSetLogical (Obsolete)

**Compatibility**

As of MATLAB version 6.5, `mxSetLogical` is obsolete. Support for `mxSetLogical` may be removed in a future version.

This function turns on an `mxArray`'s logical flag. This flag, when set, tells MATLAB that the array's data is to be treated as Boolean. If the logical flag is on, then MATLAB treats a 0 value as meaning `false` and a nonzero value as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

**See Also**

`mxClearLogical (Obsolete)`, `mxIsLogical`, `logical`

## Purpose

Set number of rows of mxArray

## Fortran Syntax

```
subroutine mxSetM(pm, m)
integer*4 pm, m
```

## Arguments

pm
Pointer to an mxArray.

m
The desired number of rows.

## Description

Call mxSetM to set the number of rows in the specified mxArray. Call mxSetN to set the number of columns.

You can use mxSetM to change the shape of an existing mxArray. Note that mxSetM does not allocate or deallocate any space for the pr, pi, ir, or jc arrays. Consequently, if your calls to mxSetM and mxSetN increase the number of elements in the mxArray, then you must enlarge the pr, pi, ir, and/or jc arrays.

If your calls to mxSetM and mxSetN end up reducing the number of elements in the array, then you may want to reduce the sizes of the pr, pi, ir, and/or jc arrays in order to use heap space more efficiently.

## See Also

mxGetM, mxGetN, mxSetN

# mxSetN

## Purpose

Set number of columns of mxArray

## Fortran Syntax

```
subroutine mxSetN(pm, n)
integer*4 pm, n
```

## Arguments

pm
Pointer to an mxArray.

n
The desired number of columns.

## Description

Call mxSetN to set the number of columns in the specified mxArray. Call mxSetM to set the number of rows in the specified mxArray.

You typically use mxSetN to change the shape of an existing mxArray. Note that mxSetN does not allocate or deallocate any space for the pr, pi, ir, or jc arrays. Consequently, if your calls to mxSetN and mxSetM increase the number of elements in the mxArray, then you must enlarge the pr, pi, ir, and/or jc arrays.

If your calls to mxSetM and mxSetN end up reducing the number of elements in the mxArray, then you may want to reduce the sizes of the pr, pi, ir, and/or jc arrays in order to use heap space more efficiently. However, reducing the size is not mandatory.

## See Also

mxGetM, mxGetN, mxSetM

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexPutVariable(workspace, name, pm)
```

instead of

```
mxSetName(pm, name);
mexPutArray(pm, workspace);
```

# mxSetNzmax

## Purpose

Set storage space for nonzero elements

## Fortran Syntax

```
subroutine mxSetNzmax(pm, nzmax)
integer*4 pm, nzmax
```

## Arguments

`pm`
Pointer to a sparse `mxArray`.

`nzmax`
The number of elements that `mxCreateSparse` should allocate to hold the arrays pointed to by `ir`, `pr`, and `pi` (if it exists). Set `nzmax` greater than or equal to the number of nonzero elements in the `mxArray`, but set it to be less than or equal to the number of rows times the number of columns. If you specify an `nzmax` value of 0, `mxSetNzmax` sets the value of `nzmax` to 1.

## Description

Use `mxSetNzmax` to assign a new value to the `nzmax` field of the specified sparse `mxArray`. The `nzmax` field holds the maximum possible number of nonzero elements in the sparse `mxArray`.

The number of elements in the `ir`, `pr`, and `pi` (if it exists) arrays must be equal to `nzmax`. Therefore, after calling `mxSetNzmax`, you must change the size of the `ir`, `pr`, and `pi` arrays.

How big should `nzmax` be? One thought is that you set `nzmax` equal to or slightly greater than the number of nonzero elements in a sparse `mxArray`. This approach conserves precious heap space. Another technique is to make `nzmax` equal to the total number of elements in an `mxArray`. This approach eliminates (or, at least reduces) expensive reallocations.

## See Also

`mxGetNzmax`

## Purpose

Set new imaginary data for `mxArray`

## Fortran Syntax

```
subroutine mxSetPi(pm, pi)
integer*4 pm, pi
```

## Arguments

`pm`
Pointer to a full (nonsparse) `mxArray`.

`pi`
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory. If `pi` points to static memory, memory errors will result when the array is destroyed.

## Description

Use `mxSetPi` to set the imaginary data of the specified `mxArray`.

See the description for `mxSetImagData`, which is an equivalent function to `mxSetPi`.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetPi` before you call `mxSetPi`.

## See Also

`mxSetPr`, `mxGetPi`, `mxGetPr`, `mxSetImagData`, `mxFree`

# mxSetPr

**Purpose** Set new real data for `mxArray`

**Fortran Syntax**

```
subroutine mxSetPr(pm, pr)
integer*4 pm, pr
```

**Arguments**

`pm`
Pointer to a full (nonsparse) `mxArray`.

`pr`
Pointer to the first element of an array. Each element in the array contains the real component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory.

**Description** Use `mxSetPr` to set the real data of the specified `mxArray`.

See the description for `mxSetData`, which is an equivalent function to `mxSetPr`.

This function does not free any memory allocated for existing data that it displaces. To free existing memory, call `mxFree` on the pointer returned by `mxGetPr` before you call `mxSetPr`.

**See Also** `mxSetPi`, `mxGetPr`, `mxGetPi`, `mxSetData`, `mxFree`

# MEX-Files (Fortran)

| | |
|---|---|
| `mexAtExit` | Register function to be called when MEX-file cleared or MATLAB terminates |
| `mexCallMATLAB` | Call MATLAB function or user-defined M-file or MEX-file |
| `mexErrMsgIdAndTxt` | Issue error with identifier and return to MATLAB |
| `mexErrMsgTxt` | Issue error and return to MATLAB |
| `mexEvalString` | Execute MATLAB command in caller's workspace |
| `mexFunction` | Entry point to Fortran MEX-file |
| `mexFunctionName` | Name of current MEX-function |
| `mexGetArray (Obsolete)` | Use `mexGetVariable` |
| `mexGetArrayPtr (Obsolete)` | Use `mexGetVariablePtr` |
| `mexGetEps (Obsolete)` | Use `mxGetEps` |
| `mexGetFull (Obsolete)` | Use `mexGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi` |
| `mexGetGlobal (Obsolete)` | Use `mexGetVariablePtr` |
| `mexGetInf (Obsolete)` | Use `mxGetInf` |
| `mexGetMatrix (Obsolete)` | Use `mexGetVariable` |
| `mexGetMatrixPtr (Obsolete)` | Use `mexGetVariablePtr` |
| `mexGetNaN (Obsolete)` | Use `mxGetNaN` |
| `mexGetVariable` | Get copy of variable from another workspace |
| `mexGetVariablePtr` | Get read-only pointer to variable from another workspace |
| `mexIsFinite (Obsolete)` | Use `mxIsFinite` |
| `mexIsGlobal` | Determine if `mxArray` has global scope |
| `mexIsInf (Obsolete)` | Use `mxIsInf` |
| `mexIsLocked` | Determine if MEX-file is locked |
| `mexIsNaN (Obsolete)` | Use `mxIsNaN` |
| `mexLock` | Prevent MEX-file from being cleared from memory |
| `mexMakeArrayPersistent` | Make `mxArray` persist after MEX-file completes |

| | |
|---|---|
| `mexMakeMemoryPersistent` | Make allocated memory persist after MEX-file completes |
| `mexPrintf` | ANSI C `printf`-style output routine |
| `mexPutArray (Obsolete)` | Use `mexPutVariable` |
| `mexPutFull (Obsolete)` | Use `mxCreateDoubleMatrix`, `mxSetPr`, `mxSetPi`, `mexPutVariable` |
| `mexPutMatrix (Obsolete)` | Use `mexPutVariable` |
| `mexPutVariable` | Copy `mxArray` from MEX-file to another workspace |
| `mexSetTrapFlag` | Control response of `mexCallMATLAB` to errors |
| `mexUnlock` | Allow MEX-file to be cleared from memory |
| `mexWarnMsgIdAndTxt` | Issue warning message with identifier |
| `mexWarnMsgTxt` | Issue warning message |

**Purpose**

Register subroutine to be called when MEX-file cleared or MATLAB terminates

**Fortran Syntax**

```
integer*4 function mexAtExit(ExitFcn)
subroutine ExitFcn()
```

**Arguments**

`ExitFcn`
The exit function. This function must be declared as `external`.

**Returns**

Always returns 0.

**Description**

Use `mexAtExit` to register a subroutine to be called just before the MEX-file is cleared or MATLAB is terminated. `mexAtExit` gives your MEX-file a chance to perform an orderly shutdown of anything under its control.

Each MEX-file can register only one active exit subroutine at a time. If you call `mexAtExit` more than once, MATLAB uses the `ExitFcn` from the more recent `mexAtExit` call as the exit function.

If a MEX-file is locked, all attempts to clear the MEX-file will fail. Consequently, if a user attempts to clear a locked MEX-file, MATLAB does not call the `ExitFcn`.

You must declare the `ExitFcn` as `external` in the Fortran routine that calls `mexAtExit` if it is not within the scope of the file.

**See Also**

`mexSetTrapFlag`

# mexCallMATLAB

**Purpose** Call MATLAB function or operator, user-defined M-file, or other MEX-file

**Fortran Syntax**

```
integer*4 function mexCallMATLAB(nlhs, plhs, nrhs, prhs, name)
integer*4 nlhs, nrhs, plhs(*), prhs(*)
character*(*) name
```

**Arguments**

`nlhs`
Number of desired output arguments. This value must be less than or equal to 50.

`plhs`
Array of `mxArray` pointers that can be used to access the returned data from the function call. Once the data is accessed, you can then call `mxFree` to free the `mxArray` pointer. By default, MATLAB frees the pointer and any associated dynamic memory it allocates when you return from the `mexFunction` call.

`nrhs`
Number of input arguments. This value must be less than or equal to 50.

`prhs`
Array of pointers to input data.

`name`
`Character` array containing the name of the MATLAB function, operator, M-file, or MEX-file that you are calling. If `name` is an operator, place the operator inside a pair of single quotes; for example, `'+'`.

**Returns** 0 if successful, and a nonzero value if unsuccessful and `mexSetTrapFlag` was previously called.

**Description** Call `mexCallMATLAB` to invoke internal MATLAB functions, MATLAB operators, M-files, or other MEX-files.

By default, if `name` detects an error, MATLAB terminates the MEX-file and returns control to the MATLAB prompt. If you want a different error behavior, turn on the trap flag by calling `mexSetTrapFlag`.

**See Also** `mexFunction`, `mexSetTrapFlag`

**Purpose**

Issue error with identifier and return to MATLAB prompt

**Fortran Syntax**

```
subroutine mexErrMsgIdAndTxt(errorid, errormsg)
character*(*) errorid, errormsg
```

**Arguments**

`errorid`
Character array containing a MATLAB message identifier. See “Message Identifiers” in the MATLAB documentation for information on this topic.

`errormsg`
`Character` array containing the error message to be displayed.

**Description**

Call `mexErrMsgIdAndTxt` to write an error message and its corresponding identifier to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgIdAndTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgIdAndTxt` does not invoke any registered exit routine to allocate memory.

If your application calls `mxCalloc` or one of the `mxCreate` routines to create `mxArray` pointers, `mexErrMsgIdAndTxt` automatically frees any associated memory allocated by these calls.

**See Also**

`mexErrMsgTxt`, `mexWarnMsgIdAndTxt`, `mexWarnMsgTxt`

# mexErrMsgTxt

**Purpose** Issue error and return to MATLAB prompt

**Fortran Syntax**

```
subroutine mexErrMsgTxt(errormsg)
character*(*) errormsg
```

**Arguments**

`errormsg`
`Character` array containing the error message to be displayed.

**Description**

Call `mexErrMsgTxt` to write an error message to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgTxt` does not invoke any registered exit routine to allocate memory.

If your application calls `mxCalloc` or one of the `mxCreate` routines to create `mxArray` pointers, `mexErrMsgTxt` automatically frees any associated memory allocated by these calls.

**See Also**

`mexErrMsgIdAndTxt`, `mexWarnMsgTxt`, `mexWarnMsgIdAndTxt`

**Purpose**

Execute MATLAB command in workspace of caller

**Fortran Syntax**

```
integer*4 function mexEvalString(command)
character*(*) command
```

**Arguments**

`command`
A `character` array containing the MATLAB command to execute.

**Returns**

0 if successful, and a nonzero value if unsuccessful.

**Description**

Call `mexEvalString` to invoke a MATLAB command in the workspace of the caller.

`mexEvalString` and `mexCallMATLAB` both execute MATLAB commands. However, `mexCallMATLAB` provides a mechanism for returning results (left-hand side arguments) back to the MEX-file; `mexEvalString` provides no way for return values to be passed back to the MEX-file.

All arguments that appear to the right of an equals sign in the `command` array must already be current variables of the caller's workspace.

**See Also**

`mexCallMATLAB`

# mexFunction

**Purpose** MATLAB entry point to Fortran MEX-file

**Fortran Syntax**

```
subroutine mexFunction(nlhs, plhs, nrhs, prhs)
integer*4 nlhs, nrhs, plhs(*), prhs(*)
```

**Arguments**

`nlhs`
The number of expected outputs.

`plhs`
Array of pointers to expected outputs.

`nrhs`
The number of inputs.

`prhs`
Array of pointers to input data. The input data is read only and should not be altered by your `mexFunction`.

**Description**

`mexFunction` is not a routine you call. Rather, `mexFunction` is the name of a subroutine you must write in every MEX-file. When you invoke a MEX-file, MATLAB searches for a subroutine named `mexFunction` inside the MEX-file. If it finds one, then the first executable line in `mexFunction` becomes the starting point of the MEX-file. If MATLAB cannot find a subroutine named `mexFunction` inside the MEX-file, MATLAB issues an error message.

When you invoke a MEX-file, MATLAB automatically loads `nlhs`, `plhs`, `nrhs`, and `prhs` with the caller's information. In the syntax of the MATLAB language, functions have the general form

```
[a,b,c, ] = fun(d,e,f, )
```

where the denotes more items of the same format. The `a,b,c` are left-hand side arguments and the `d,e,f` are right-hand side arguments. The arguments `nlhs` and `nrhs` contain the number of left-hand side and right-hand side arguments, respectively, with which the MEX-file is called. `prhs` is an array of `mxArray` pointers whose length is `nrhs`. `plhs` is a pointer to an array whose length is `nlhs`, where your function must set pointers for the returned left-hand side `mxArrays`.

**Purpose** Get name of current MEX-function

**Fortran Syntax**

```
character*(*) function mexFunctionName()
```

**Arguments** None

**Returns** The name of the current MEX-function.

**Description** `mexFunctionName` returns the name of the current MEX-function.

# mexGetArray (Obsolete)

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariable(workspace, name)
```

instead of

```
mexGetArray(name, workspace)
```

**See Also**

`mexGetVariable`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariablePtr(workspace, varname)
```

instead of

```
mexGetArrayPtr(varname, workspace)
```

**See Also**

`mexGetVariablePtr`

# mexGetEps (Obsolete)

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxGetEps` instead.

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mexGetVariable("caller", name)
m = mxGetM(pm)
n = mxGetN(pm)
pr = mxGetPr(pm)
pi = mxGetPi(pm)
```

instead of

```
mexGetFull(name, m, n, pr, pi)
```

**See Also**

`mexGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`

# mexGetGlobal (Obsolete)

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariablePtr("global", name)
```

instead of

```
mexGetGlobal(name)
```

**See Also**

`mexGetVariablePtr`, `mxGetPr`, `mxGetPi`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxGetInf` instead.

# mexGetMatrix (Obsolete)

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariable("caller", name)
```

instead of

```
mexGetMatrix(name)
```

**See Also**

`mexGetVariable`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariablePtr("caller", name)
```

instead of

```
mexGetMatrixPtr(name)
```

**See Also**

`mexGetVariablePtr`

# mexGetNaN (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxGetNaN` instead.

**Purpose** Get copy of variable from specified workspace

**Fortran Syntax**

```
integer*4 function mexGetVariable(workspace, varname)
character*(*) workspace, varname
```

**Arguments**

`workspace`
Specifies where `mexGetVariable` should search in order to find variable `varname`. The possible values are:

| | |
|---|---|
| `base` | Search for the variable in the base workspace |
| `caller` | Search for the variable in the caller's workspace |
| `global` | Search for the variable in the global workspace |

`varname`
Name of the variable to copy.

**Returns** A copy of the variable on success. Returns `0` on failure. A common cause of failure is specifying a variable that is not currently in the workspace.

**Description** Call `mexGetVariable` to get a copy of the specified variable. The returned `mxArray` contains a copy of all the data and characteristics that the variable had in the other workspace. Modifications to the returned `mxArray` do not affect the variable in the workspace unless you write the copy back to the workspace with `mexPutVariable`.

**See Also** `mexGetVariablePtr`, `mexPutVariable`

# mexGetVariablePtr

**Purpose**

Get read-only pointer to variable from specified workspace

**Fortran Syntax**

```
integer*4 function mexGetVariablePtr(workspace, varname)
character*(*) workspace, varname
```

**Arguments**

`workspace`
Specifies which workspace you want `mexGetVariablePtr` to search. The possible values are:

| | |
|---|---|
| `base` | Search for the variable in the base workspace |
| `caller` | Search for the variable in the caller's workspace |
| `global` | Search for the variable in the global workspace |

`varname`
Name of the variable to copy. (Note that this is a variable name, not an `mxArray` pointer.)

**Returns**

A read-only pointer to the `mxArray` on success. Returns `0` on failure.

**Description**

Call `mexGetVariablePtr` to get a read-only pointer to the specified variable `varname` from the specified workspace. This command is useful for examining an `mxArray`'s data and characteristics. If you need to change data or characteristics, use `mexGetVariable` (along with `mexPutVariable`) instead of `mexGetVariablePtr`.

**See Also**

`mexGetVariable`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsFinite` instead.

# mexIsGlobal

## Purpose

Determine if mxArray has global scope

## Fortran Syntax

```
integer*4 function mexIsGlobal(pm)
integer*4 pm
```

## Arguments

pm
Pointer to an mxArray.

## Returns

Logical 1 (true) if the mxArray has global scope, and logical 0 (false) otherwise.

## Description

Use mexIsGlobal to determine if the specified mxArray has global scope.

## See Also

mexGetVariable, mexGetVariablePtr, mexPutVariable, global

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsInf` instead.

# mexIsLocked

**Purpose**

Determine if MEX-file is locked

**Fortran Syntax**

```
integer*4 function mexIsLocked()
```

**Arguments**

`None`

**Returns**

Logical `1` (`true`) if the MEX-file is locked; logical `0` (`false`) if the file is unlocked.

**Description**

Call `mexIsLocked` to determine if the MEX-file is locked. By default, MEX-files are unlocked, meaning that users can clear the MEX-file at any time.

To unlock a MEX-file, call `mexUnlock`.

**See Also**

`mexLock`, `mexUnlock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsNaN` instead.

# mexLock

**Purpose** Prevent MEX-file from being cleared from memory

**Fortran Syntax**

```
subroutine mexLock()
```

**Arguments** `None`

**Description** By default, MEX-files are unlocked, meaning that a user can clear them at any time. Call `mexLock` to prohibit a MEX-file from being cleared.

To unlock a MEX-file, call `mexUnlock`.

`mexLock` increments a lock count. If you call `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

**See Also** `mexIsLocked`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mexUnlock`

**Purpose** Make mxArray persist after MEX-file completes

**Fortran Syntax**

```
subroutine mexMakeArrayPersistent(pm)
integer*4 pm
```

**Arguments**

pm
Pointer to an mxArray created by an mxCreate* routine.

**Description**

By default, mxArrays allocated by mxCreate* routines are not persistent. The MATLAB memory management facility automatically frees nonpersistent mxArrays when the MEX-file finishes. If you want the mxArray to persist through multiple invocations of the MEX-file, you must call mexMakeArrayPersistent.

---

**Note** If you create a persistent mxArray, you are responsible for destroying it when the MEX-file is cleared. If you do not destroy a persistent mxArray, MATLAB will leak memory. See mexAtExit on how to register a function that gets called when the MEX-file is cleared. See mexLock on how to lock your MEX-file so that it is never cleared.

---

**See Also** mexAtExit, mexLock, mexMakeMemoryPersistent, and the mxCreate functions.

# mexMakeMemoryPersistent

**Purpose** Make allocated memory persist after MEX-file completes

**Fortran Syntax**

```
subroutine mexMakeMemoryPersistent(ptr)
integer*4 ptr
```

**Arguments**

`ptr`
Pointer to the beginning of memory allocated by one of the MATLAB memory allocation routines.

**Description** By default, memory allocated by MATLAB is nonpersistent, so it is freed automatically when the MEX-file finishes. If you want the memory to persist, you must call `mexMakeMemoryPersistent`.

---

**Note** If you create persistent memory, you are responsible for freeing it when the MEX-file is cleared. If you do not free the memory, MATLAB will leak memory. To free memory, use `mxFree`. See `mexAtExit` on how to register a function that gets called when the MEX-file is cleared. See `mexLock` on how to lock your MEX-file so that it is never cleared.

---

**See Also** `mexAtExit`, `mexLock`, `mexMakeArrayPersistent`, `mxCalloc`, `mxFree`, `mxMalloc`, `mxRealloc`

**Purpose** Print `character` array

**Fortran Syntax**

```
integer*4 function mexPrintf(message)
character*(*) message
```

**Arguments**

`message`
Character array containing message to be displayed.

---

**Note** Optional arguments to `mexPrintf`, such as format strings, are not supported in Fortran.

---

**Note** If you want the literal `%` in your message, you must use `%%` in your message string since `%` has special meaning to `mexPrintf`. Failing to do so causes unpredictable results.

---

**Returns** The number of characters printed. This includes characters specified with backslash codes, such as `\n` and `\b`.

**Description** `mexPrintf` prints a `character` array on the screen and in the diary (if the diary is in use). It provides a callback to the standard C `printf` routine already linked inside MATLAB.

**See Also** `mexErrMsgTxt`

# mexPutArray (Obsolete)

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexPutVariable(workspace, name, pm)
```

instead of

```
mxSetName(pm, name);
mexPutArray(pm, workspace);
```

**See Also**

`mexPutVariable`

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mxCreateDoubleMatrix(m, n, 1)
mxSetPr(pm, pr)
mxSetPi(pm, pi)
mexPutVariable("caller", name, pm)
```

instead of

```
mexPutFull(name, m, n, pr, pi)
```

**See Also**

`mxCreateDoubleMatrix`, `mxSetName (Obsolete)`, `mxSetPr`, `mxSetPi`, `mexPutVariable`

# mexPutMatrix (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexPutVariable("caller", name, pm)
```

instead of

```
mexPutMatrix(pm)
```

**See Also** `mexPutVariable`

**Purpose**

Copy `mxArray` into specified workspace

**Fortran Syntax**

```
integer*4 function mexPutVariable(workspace, varname, pm)
character*(*) workspace, varname
integer*4 pm
```

**Arguments**

`workspace`
Specifies the scope of the array that you are copying. The possible values are:

| | |
|---|---|
| `base` | Copy the `mxArray` to the base workspace |
| `caller` | Copy the `mxArray` to the caller's workspace |
| `global` | Copy the `mxArray` to the list of global variables |

`varname`
Name given to the `mxArray` in the workspace.

`pm`
Pointer to an `mxArray`.

**Returns**

`0` on success; `1` on failure. A possible cause of failure is that the `pm` argument is zero.

**Description**

Call `mexPutVariable` to copy the `mxArray`, at pointer `pm`, from your MEX-file into the specified workspace. MATLAB gives the name, `varname`, to the copied `mxArray` in the receiving workspace.

`mexPutVariable` makes the array accessible to other entities, such as MATLAB, M-files or other MEX-files.

If a variable of the same name already exists in the specified `workspace`, `mexPutVariable` overwrites the previous contents of the variable with the contents of the new `mxArray`. For example, suppose the MATLAB workspace defines variable `Peaches` as

```
Peaches
1      2      3      4
```

and you call `mexPutVariable` to copy `Peaches` into the MATLAB workspace.

```
mexPutVariable("base", "Peaches", pm)
```

Then the old value of `Peaches` disappears and is replaced by the value passed in by `mexPutVariable`.

### See Also

`mexGetVariable`

# mexSetTrapFlag

## Purpose

Control response of `mexCallMATLAB` to errors

## Fortran Syntax

```
subroutine mexSetTrapFlag(trapflag)
integer*4 trapflag
```

## Arguments

`trapflag`
Control flag. Currently, the only legal values are:

| | |
|---|---|
| `0` | On error, control returns to the MATLAB prompt. |
| `1` | On error, control returns to your MEX-file. |

## Description

Call `mexSetTrapFlag` to control the MATLAB response to errors in `mexCallMATLAB`.

If you do not call `mexSetTrapFlag`, then whenever MATLAB detects an error in a call to `mexCallMATLAB`, MATLAB automatically terminates the MEX-file and returns control to the MATLAB prompt. Calling `mexSetTrapFlag` with `trapflag` set to `0` is equivalent to not calling `mexSetTrapFlag` at all.

If you call `mexSetTrapFlag` and set the `trapflag` to `1`, then whenever MATLAB detects an error in a call to `mexCallMATLAB`, MATLAB does not automatically terminate the MEX-file. Rather, MATLAB returns control to the line in the MEX-file immediately following the call to `mexCallMATLAB`. The MEX-file is then responsible for taking an appropriate response to the error.

If you call `mexSetTrapFlag`, the value of the `trap_flag` you set remains in effect until the next call to `mexSetTrapFlag` within that MEX-file or, if there are no more calls to `mexSetTrapFlag`, until the MEX-file exits. If a routine defined in a MEX-file calls another MEX-file:

1. The current value of the `trap_flag` in the first MEX-file is saved.
2. The second MEX-file is called with the `trap_flag` initialized to 0 within that file.
3. When the second MEX-file exits, the saved value of the `trap_flag` in the first MEX-file is restored within that file.

## See Also

`mexAtExit`, `mexErrMsgTxt`

# mexUnlock

**Purpose**

Allow MEX-file to be cleared from memory

**Fortran Syntax**

```
subroutine mexUnlock()
```

**Arguments**

`none`

**Description**

By default, MEX-files are unlocked, meaning that a user can clear them at any time. Calling `mexLock` locks a MEX-file so that it cannot be cleared. Calling `mexUnlock` removes the lock so that the MEX-file can be cleared.

`mexLock` increments a lock count. If you called `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

**See Also**

`mexIsLocked`, `mexLock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

**Purpose** Issue warning message with identifier

**Fortran Syntax**

```
subroutine mexWarnMsgIdAndTxt(warningid, warningmsg)
character*(*) warningid, warningmsg
```

**Arguments**

`errorid`
Character array containing a MATLAB message identifier. See “Message Identifiers” in the MATLAB documentation for information on this topic.

`warningmsg`
String containing the warning message to be displayed.

**Description** `mexWarnMsgIdAndTxt` causes MATLAB to display the contents of `warningmsg`.

Unlike `mexErrMsgIdAndTxt`, `mexWarnMsgIdAndTxt` does not cause the MEX-file to terminate.

**See Also** `mexWarnMsgTxt`, `mexErrMsgIdAndTxt`, `mexErrMsgTxt`

# mexWarnMsgTxt

**Purpose** Issue warning message

**Fortran Syntax**

```
subroutine mexWarnMsgTxt(warningmsg)
character*(*) warningmsg
```

**Arguments**

`warningmsg`
String containing the warning message to be displayed.

**Description**

`mexWarnMsgTxt` causes MATLAB to display the contents of `warningmsg`.

Unlike `mexErrMsgTxt`, `mexWarnMsgTxt` does not cause the MEX-file to terminate.

**See Also**

`mexWarnMsgIdAndTxt`, `mexErrMsgTxt`, `mexErrMsgIdAndTxt`

# MATLAB Engine (Fortran)

| | |
|---|---|
| `engClose` | Quit MATLAB engine session |
| `engEvalString` | Evaluate expression in character array |
| `engGetArray (Obsolete)` | Use `engGetVariable` |
| `engGetFull (Obsolete)` | Use `engGetVariable` followed by appropriate `mxGet` routines |
| `engGetMatrix (Obsolete)` | Use `engGetVariable` |
| `engGetVariable` | Copy variable from engine workspace |
| `engOpen` | Start MATLAB engine session |
| `engOutputBuffer` | Specify buffer for MATLAB output |
| `engPutArray (Obsolete)` | Use `engPutVariable` |
| `engPutFull (Obsolete)` | Use `mxCreateDoubleMatrix` and `engPutVariable` |
| `engPutMatrix (Obsolete)` | Use `engPutVariable` |
| `engPutVariable` | Put variables into engine workspace |

# engClose

**Purpose**

Quit MATLAB engine session

**Fortran Syntax**

```
integer*4 function engClose(ep)
integer*4 ep
```

**Arguments**

`ep`
Engine pointer.

**Description**

This routine allows you to quit a MATLAB engine session.

`engClose` sends a quit command to the MATLAB engine session and closes the connection. It returns 0 on success, and 1 otherwise. Possible failure includes attempting to terminate a MATLAB engine session that was already terminated.

**Examples**

See `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a Fortran program.

**Purpose** Evaluate expression in `character` array

**Fortran Syntax**

```
integer*4 function engEvalString(ep, command)
integer*4 ep
character*(*) command
```

**Arguments**

`ep`
Engine pointer.

`command`
`character` array to execute.

**Description**

`engEvalString` evaluates the expression contained in `command` for the MATLAB engine session, `ep`, previously started by `engOpen`. It returns a nonzero value if the MATLAB session is no longer running, and zero otherwise.

On UNIX systems, `engEvalString` sends commands to MATLAB by writing down a pipe connected to the MATLAB *`stdin`*. Any output resulting from the command that ordinarily appears on the screen is read back from *`stdout`* into the buffer defined by `engOutputBuffer`.

**Examples**

See `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a Fortran program.

**See Also**

`engOpen`, `engOutputBuffer`

# engGetArray (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `engGetVariable` instead.

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mp = engGetVariable(ep, name)
m  = mxGetM(pm)
n  = mxGetN(pm)
pr = mxGetPr(pm)
pi = mxGetPi(pm)
mxDestroyArray(pm)
```

instead of

```
engGetFull(ep, name, m, n, pr, pi)
```

**See Also** `engGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`, `mxDestroyArray`

# engGetMatrix (Obsolete)

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `engGetVariable` instead.

# engGetVariable

**Purpose**

Copy variable from MATLAB engine workspace

**Fortran Syntax**

```
integer*4 function engGetVariable(ep, name)
integer*4 ep
character*(*) name
```

**Arguments**

`ep`
Engine pointer.

`name`
Name of `mxArray` to get from MATLAB.

**Description**

`engGetVariable` reads the named `mxArray` from the MATLAB engine session associated with `ep` and returns a pointer to a newly allocated `mxArray` structure, or `0` if the attempt fails. `engGetVariable` fails if the named variable does not exist.

Be careful in your code to free the `mxArray` created by this routine when you are finished with it.

**See Also**

`engPutVariable`

**Purpose**

Start MATLAB engine session

**Fortran Syntax**

```
integer*4 function engOpen(startcmd)
integer*4 ep
character*(*) startcmd
```

**Arguments**

`ep`
Engine pointer.

`startcmd`
`Character` array to start a MATLAB process.

**Description**

This routine allows you to start a MATLAB process to use MATLAB as a computational engine.

`engOpen(startcmd)` starts a MATLAB process using the command specified in `startcmd`, establishes a connection, and returns a unique engine identifier, or 0 if the open fails.

On the UNIX system, if `startcmd` is empty, `engOpen` starts MATLAB on the current host using the command `matlab`. If `startcmd` is a hostname, `engOpen` starts MATLAB on the designated host by embedding the specified hostname string into the larger string:

```
"rsh hostname \"/bin/csh -c 'setenv DISPLAY\
   hostname:0; matlab'\""
```

If `startcmd` is anything else (has white space in it, or nonalphanumeric characters), it is executed literally to start MATLAB.

`engOpen` performs the following steps:

1. Creates two pipes.
2. Forks a new process and sets up the pipes to pass *`stdin`* and *`stdout`* from the child to two file descriptors in the parent.
3. Executes a command to run MATLAB (`rsh` for remote execution).

**Examples**

See `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a Fortran program.

**Purpose**

Specify buffer for MATLAB output

**Fortran Syntax**

```
integer*4 function engOutputBuffer(ep, p)
integer*4 ep
character*n p
```

**Arguments**

`ep`
Engine pointer.

`p`
Character buffer of length `n`, where `n` is the length of buffer `p`.

**Description**

`engOutputBuffer` defines a character buffer for `engEvalString` to return any output that would appear on the screen. It returns `1` if you pass it a NULL engine pointer. Otherwise, it returns `0`.

The default behavior of `engEvalString` is to discard any standard output caused by the command it is executing. `engOutputBuffer(ep, p)` tells any subsequent calls to `engEvalString` to save the first `n` characters of output in the character buffer `p`.

# engPutArray (Obsolete)

**Compatibility**

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
engPutVariable(ep, name, pm)
```

instead of

```
mxSetName(pm, name);
engPutArray(pm, ep);
```

## Compatibility

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mp = mxCreateDoubleMatrix(m, n, 1)
mxSetPr(pm, pr)
mxSetPi(pm, pi)
engPutVariable(ep, name, pm)

mxDestroyArray(pm)
```

instead of

```
engPutFull(ep, name, m, n, pr, pi)
```

## See Also

`engPutVariable`, `mxCreateDoubleMatrix`, `mxSetPr`, `mxSetPi`, `mxDestroyArray`

# engPutMatrix (Obsolete)

**Compatibility** This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `engPutVariable` instead.

**Purpose** Put variables into MATLAB engine workspace

**Fortran Syntax**

```
integer*4 function engPutVariable(ep, name, pm)
integer*4 ep, pm
character*(*) name
```

**Arguments**

`ep`
Engine pointer.

`name`
Name given to the `mxArray` in the engine's workspace.

`pm`
`mxArray` pointer.

**Description**

`engPutVariable` writes `mxArray` `mp` to the engine `ep`. If the `mxArray` does not exist in the workspace, it is created. If an `mxArray` with the same name already exists in the workspace, the existing `mxArray` is replaced with the new `mxArray`.

`engPutVariable` returns `0` if successful and `1` if an error occurs.

**See Also**

`engGetVariable`

# Java

| | |
|---|---|
| `class` | Create object or return class of object |
| `fieldnames` | Return property names of object |
| `import` | Add package or class to current Java import list |
| `inspect` | Display graphical interface to list and modify property values |
| `isa` | Determine if input is object of given class |
| `isjava` | Determine if input is Java object |
| `ismethod` | Determine if input is object method |
| `isprop` | Determine if input is object property |
| `javaaddpath` | Add entries to dynamic Java class path |
| `javaArray` | Construct Java array |
| `javachk` | Generate error message based on Java feature support |
| `javaclasspath` | Set and get dynamic Java class path |
| `javaMethod` | Invoke Java method |
| `javaObject` | Construct Java object |
| `javarmpath` | Remove entries from dynamic Java class path |
| `methods` | Display information on class methods |
| `methodsview` | Display information on class methods in separate window |
| `usejava` | Determine if Java feature is supported in MATLAB |

# 11

# Component Object Model and ActiveX

This section describes the functions that support the MATLAB interface to Component Object Model (COM) technology. These fall into the following two categories.

| | |
|---|---|
| COM Client (p. 11-2) | Functions that enable a MATLAB client application to start a COM server or control, and to interact with its properties, methods, and events. |
| COM Server (p. 11-4) | Functions called from a client application that execute in the MATLAB server enabling the client to execute commands and access data on the server. |

# COM Client

| | |
|---|---|
| `actxcontrol` | Create ActiveX control in figure window |
| `actxcontrollist` | List all currently installed ActiveX controls |
| `actxcontrolselect` | Display graphical interface for creating ActiveX control |
| `actxserver` | Create COM Automation server |
| `addproperty` | Add custom property to object |
| `class` | Create object or return class of object |
| `delete` | Delete COM control or server |
| `deleteproperty` | Remove custom property from object |
| `eventlisteners` | Return list of events attached to listeners |
| `events` | Return list of events the control can trigger |
| `fieldnames` | Return property names of object |
| `get` | Get property value from interface, or display properties |
| `inspect` | Display graphical interface to list and modify property values |
| `interfaces` | List custom interfaces to COM server |
| `invoke` | Invoke method on object or interface, or display methods |
| `isa` | Detect object of given MATLAB class or Java class |
| `iscom` | Determine if input is COM object |
| `isevent` | Determine if input is event |
| `isinterface` | Determine if input is COM interface |
| `ismethod` | Determine if input is object method |
| `isprop` | Determine if input is object property |
| `load` | Initialize control object from file |
| `methods` | List all methods for control or server |
| `methodsview` | Display graphical interface to list method information |
| `move` | Move or resize control in parent window |

| | |
|---|---|
| `propedit` | Display built-in property page for control |
| `registerevent` | Register event handler with control's event |
| `release` | Release interface |
| `save` | Serialize control object to file |
| `send` | Obsolete — duplicate of `events` |
| `set` | Set object or interface property to specified value |
| `unregisterallevents` | Unregister all events for control |
| `unregisterevent` | Unregister event handler with control's event |

## COM Server

| | |
|---|---|
| `enableservice` | Enable DDE or COM Automation server |
| `Execute` | Execute MATLAB command in server |
| `Feval` | Evaluate MATLAB function in server |
| `GetCharArray` | Get character array from server |
| `GetFullMatrix` | Get matrix from server |
| `GetVariable` | Returns data from variable in server workspace |
| `GetWorkspaceData` | Get data from server workspace |
| `MaximizeCommandWindow` | Display server window on Windows desktop |
| `MinimizeCommandWindow` | Minimize size of server window |
| `PutCharArray` | Store character array in server |
| `PutFullMatrix` | Store matrix in server |
| `PutWorkspaceData` | Store data in server workspace |
| `Quit` | Terminate MATLAB server |

12

# Dynamic Data Exchange

| | |
|---|---|
| `ddeadv` | Set up advisory link |
| `ddeexec` | Send string for execution |
| `ddeinit` | Initiate DDE conversation |
| `ddepoke` | Send data to application |
| `ddereq` | Request data from application |
| `ddeterm` | Terminate DDE conversation |
| `ddeunadv` | Release advisory link |

# 13

# Web Services

| | |
|---|---|
| `callSoapService` | Send SOAP message off to endpoint |
| `createClassFromWsdl` | Create MATLAB object based on WSDL file |
| `createSoapMessage` | Create SOAP message to send to server |
| `parseSoapResponse` | Convert response string from SOAP server into MATLAB data types |

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# Serial Port Devices

| | |
|---|---|
| `clear` | Remove serial port object from MATLAB workspace |
| `delete` | Remove serial port object from memory |
| `disp` | Display serial port object summary information |
| `fclose` | Disconnect serial port object from the device |
| `fgetl` | Read from device and discard the terminator |
| `fgets` | Read from device and include the terminator |
| `fopen` | Connect serial port object to the device |
| `fprintf` | Write text to the device |
| `fread` | Read binary data from the device |
| `fscanf` | Read data from device and format as text |
| `fwrite` | Write binary data to the device |
| `get` | Return serial port object properties |
| `instrcallback` | Display event information when an event occurs |
| `instrfind` | Return serial port objects from memory to the MATLAB workspace |
| `isvalid` | Determine if serial port objects are valid |
| `length` | Length of serial port object array |
| `load` | Load serial port objects and variables into MATLAB workspace |
| `readasync` | Read data asynchronously from the device |
| `record` | Record data and event information to a file |
| `save` | Save serial port objects and variables to MAT-file |
| `serial` | Create a serial port object |
| `serialbreak` | Send break to device connected to the serial port |
| `set` | Configure or display serial port object properties |
| `size` | Size of serial port object array |
| `stopasync` | Stop asynchronous read and write operations |

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## O



## P



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