NAG C Library Function Document

nag_zge_norm (f16uac)

1   Purpose

nag_zge_norm (f16uac) calculates the value of the 1-norm, the infinity-norm the Frobenius norm, or the maximum absolute value of the elements, of a complex m by n matrix.

2   Specification

```
void nag_zge_norm (Nag_OrderType order, Nag_NormType norm, Integer m, Integer n,
    const Complex a[], Integer pda, double *r, NagError *fail)
```

3   Description

Given a complex m by n matrix, A, nag_zge_norm (f16uac) calculates one of the values given by

$$||A||_1 = \max_j \sum_{i=1}^{m} |a_{ij}|,$$

$$||A||_\infty = \max_i \sum_{j=1}^{n} |a_{ij}|,$$

$$||A||_F = \left(\sum_{i=1}^{m} \sum_{j=1}^{n} |a_{ij}|^2 \right)^{1/2},$$

$$\max_{i,j} |a_{ij}|.$$

4   References

The BLAS Technical Forum Standard (2001) *www.netlib.org/blas/blast-forum*

5   Parameters

1:    **order** – Nag_OrderType   *Input*

On entry: the **order** parameter specifies the two-dimensional storage scheme being used, i.e., row-major ordering or column-major ordering. C language defined storage is specified by **order** = **Nag_RowMajor**. See Section 2.2.1.4 of the Essential Introduction for a more detailed explanation of the use of this parameter.

Constraint: **order** = **Nag_RowMajor** or **Nag_ColMajor**.

2:    **norm** – Nag_NormType   *Input*

On entry: specifies the value to be returned:

if **norm** = **Nag_OneNorm**, the 1-norm;

if **norm** = **Nag_InfNorm**, the infinity-norm;

if **norm** = **Nag_FrobeniusNorm**, the Frobenius (or Euclidean) norm;

if **norm** = **Nag_MaxNorm**, the value $\max_{i,j} |a_{ij}|$ (not a norm).

Constraint: **norm** = **Nag_OneNorm**, **Nag_InfNorm**, **Nag_FrobeniusNorm** or **Nag_MaxNorm**.

3: **m** – Integer   *Input*

On entry: m, the number of rows of the matrix A.

Constraint: $\mathbf{m} \geq 0$.

4: **n** – Integer   *Input*

On entry: n, the number of columns of the matrix A.

Constraint: $\mathbf{n} \geq 0$.

5: **a**[dim] – const Complex   *Input*

Note: the dimension, dim, of the array **a** must be at least $\max(1, \mathbf{pda} \times \mathbf{n})$ when **order** = **Nag_ColMajor** and at least $\max(1, \mathbf{pda} \times \mathbf{m})$ when **order** = **Nag_RowMajor**.

If **order** = **Nag_ColMajor**, the (i,j)th element of the matrix A is stored in $\mathbf{a}[(j-1) \times \mathbf{pda} + i - 1]$ and if **order** = **Nag_RowMajor**, the (i,j)th element of the matrix A is stored in $\mathbf{a}[(i-1) \times \mathbf{pda} + j - 1]$.

On entry: the m by n matrix A.

6: **pda** – Integer   *Input*

On entry: the stride separating matrix row or column elements (depending on the value of **order**) in the array **a**.

Constraints:

if **order** = **Nag_ColMajor**, $\mathbf{pda} \geq \max(1, \mathbf{m})$;
if **order** = **Nag_RowMajor**, $\mathbf{pda} \geq \max(1, \mathbf{n})$.

7: **r** – double *   *Output*

On exit: the value of the norm specified by **norm**.

8: **fail** – NagError *   *Input/Output*

The NAG error parameter (see the Essential Introduction).

6   Error Indicators and Warnings

NE_INT

On entry, $\mathbf{m} = \langle value \rangle$.
Constraint: $\mathbf{m} \geq 0$.

On entry, $\mathbf{n} = \langle value \rangle$.
Constraint: $\mathbf{n} \geq 0$.

On entry, $\mathbf{pda} = \langle value \rangle$.
Constraint: $\mathbf{pda} \geq \max(1, \mathbf{m})$.

On entry, $\mathbf{pda} = \langle value \rangle$.
Constraint: $\mathbf{pda} \geq \max(1, \mathbf{n})$.

NE_BAD_PARAM

On entry, parameter $\langle value \rangle$ had an illegal value.

7   Accuracy

The BLAS standard requires accurate implementations which avoid unnecessary over/underflow (see section 2.7 of The BLAS Technical Forum Standard (2001)).

8   Further Comments

None.

9   Example

See Section 9 of the documents for nag_zgecon (f07auc) and nag_ztrsna (f08qyc).