

NAG C Library Function Document

nag_zsy_norm (f16ufc)

1 Purpose

nag_zsy_norm (f16ufc) calculates the value of the 1-norm, the infinity-norm, the Frobenius norm, or the maximum absolute value of the elements, of a complex n by n symmetric matrix.

2 Specification

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

3 Description

Given a complex n by n symmetric matrix, A , nag_zsy_norm (f16ufc) calculates one of the values given by

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

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

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

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

Note that, since A is symmetric, $\|A\|_1 = \|A\|_\infty$.

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: **uplo** – Nag_UploType *Input*

On entry: specifies whether the upper or lower triangular part of A is stored as follows:

if **uplo** = **Nag_Upper**, the upper triangular part of A is stored;

if **uplo** = **Nag_Lower**, the lower triangular part of A is stored.

Constraint: **uplo** = **Nag_Upper** or **Nag_Lower**.

4: **n** – Integer *Input*

On entry: n , the order of the matrix A .

Constraint: $n \geq 0$.

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

Note: the dimension, *dim*, of the array **a** must be at least $\max(1, \mathbf{pda} \times \mathbf{n})$.

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

On entry: the n by n symmetric matrix A . If **uplo** = **Nag_Upper**, the upper triangle of A must be stored and the elements of the array below the diagonal are not referenced; if **uplo** = **Nag_Lower**, the lower triangle of A must be stored and the elements of the array above the diagonal are not referenced.

6: **pda** – Integer *Input*

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

Constraint: $\mathbf{pda} \geq \max(1, \mathbf{n})$.

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, **n** = $\langle value \rangle$.

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

On entry, **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 document for nag_zsycon (f07nuc).
