

NAG C Library Function Document

nag_zge_norm (f16uac)

1 Purpose

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

2 Specification

```
#include <nag.h>
#include <nagf16.h>
```

```
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

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

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

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

or

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

4 References

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

5 Arguments

1: **order** – Nag_OrderType *Input*

On entry: the **order** argument 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 argument.

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

2: **norm** – Nag_NormType *Input*

On entry: specifies the value to be returned.

norm = Nag_OneNorm

The 1-norm.

norm = Nag_InfNorm

The ∞ -norm.

norm = Nag_FrobeniusNorm

The Frobenius (or Euclidean) norm.

norm = Nag_MaxNorm

The value $\max_{ij} |a_{ij}|$ (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: $m \geq 0$.

4: **n** – Integer *Input*

On entry: n , the number of columns 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

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

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

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 argument (see Section 2.6 of the Essential Introduction).

6 Error Indicators and Warnings

NE_ALLOC_FAIL

Dynamic memory allocation failed.

NE_BAD_PARAM

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

NE_INT

On entry, **m** = $\langle value \rangle$.
Constraint: **m** ≥ 0 .

On entry, **n** = $\langle value \rangle$.
Constraint: **n** ≥ 0 .

NE_INT_2

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

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

NE_INTERNAL_ERROR

An internal error has occurred in this function. Check the function call and any array sizes. If the call is correct then please consult NAG for assistance.

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).
