NAG Library Routine Document

F06ULF

Note: before using this routine, please read the Users' Note for your implementation to check the interpretation of ***bold italicised*** terms and other implementation-dependent details.

1 Purpose

F06ULF returns, via the function name, the value of the 1-norm, the ∞-norm, the Frobenius norm, or the maximum absolute value of the elements of a complex n by n triangular band matrix.

2 Specification

```
FUNCTION F06ULF (NORM, UPLO, DIAG, N, K, AB, LDAB, WORK)
REAL (KIND=nag_wp) F06ULF
INTEGER                 N, K, LDAB
REAL (KIND=nag_wp)      WORK(*)
COMPLEX (KIND=nag_wp) AB(LDAB,*)
CHARACTER(1)            NORM, UPLO, DIAG
```

3 Description

None.

4 References

None.

5 Arguments

1: NORM – CHARACTER(1) *Input*

On entry: specifies the value to be returned.

NORM = '1' or 'O'
The 1-norm.

NORM = 'I'
The ∞-norm.

NORM = 'F' or 'E'
The Frobenius (or Euclidean) norm.

NORM = 'M'
The value $\max_{i,j} \left|a_{ij}\right|$ (not a norm).

Constraint: NORM = '1', 'O', 'I', 'F', 'E' or 'M'.

2: UPLO – CHARACTER(1) *Input*

On entry: specifies whether A is upper or lower triangular.

UPLO = 'U'
A is upper triangular.

UPLO = 'L'
A is lower triangular.

Constraint: UPLO = 'U' or 'L'.

3: DIAG – CHARACTER(1) *Input*

On entry: specifies whether A has nonunit or unit diagonal elements.

DIAG = 'N'
The diagonal elements are stored explicitly.

DIAG = 'U'
The diagonal elements are assumed to be 1, and are not referenced.

Constraint: DIAG = 'N' or 'U'.

4: N – INTEGER *Input*

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

When N = 0, F06ULF returns zero.

Constraint: N $\geq$ 0.

5: K – INTEGER *Input*

On entry: k, the number of subdiagonals or superdiagonals of the matrix A.

Constraint: K $\geq$ 0.

6: AB(LDAB, $*$) – COMPLEX (KIND=nag_wp) array *Input*

Note: the second dimension of the array AB must be at least N.

On entry: the n by n triangular band matrix A

The matrix is stored in rows 1 to $k+1$, more precisely,

if UPLO = 'U', the elements of the upper triangle of A within the band must be stored with element A_{ij} in AB$(k+1+i-j,j)$ for $\max(1,j-k) \leq i \leq j$;

if UPLO = 'L', the elements of the lower triangle of A within the band must be stored with element A_{ij} in AB$(1+i-j,j)$ for $j \leq i \leq \min(n,j+k)$.

If DIAG = 'U', the diagonal elements of A are assumed to be 1, and are not referenced.

7: LDAB – INTEGER *Input*

On entry: the first dimension of the array AB as declared in the (sub)program from which F06ULF is called.

Constraint: LDAB $\geq$ K + 1.

8: WORK($*$) – REAL (KIND=nag_wp) array *Workspace*

Note: the dimension of the array WORK must be at least $\max(1,\text{N})$ if NORM = 'I', and at least 1 otherwise.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

F06ULF is not threaded in any implementation.

9 Further Comments

None.

10 Example

None.