

# NAG Library Routine Document

## F06UMF

**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

F06UMF returns, via the function name, the value of the 1-norm, the  $\infty$ -norm, the Frobenius norm, or the maximum absolute value of the elements of a complex  $n$  by  $n$  upper Hessenberg matrix.

### 2 Specification

```
FUNCTION F06UMF (NORM, N, A, LDA, WORK)
REAL (KIND=nag_wp) F06UMF
INTEGER                N, LDA
REAL (KIND=nag_wp)    WORK(*)
COMPLEX (KIND=nag_wp) A(LDA,*)
CHARACTER(1)          NORM
```

### 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  $\infty$ -norm.  
 NORM = 'F' or 'E'  
     The Frobenius (or Euclidean) norm.  
 NORM = 'M'  
     The value  $\max_{i,j} |a_{ij}|$  (not a norm).  
*Constraint:* NORM = '1', 'O', 'I', 'F', 'E' or 'M'.
- 2: N – INTEGER *Input*  
*On entry:*  $n$ , the order of the matrix  $A$ .  
 When  $N = 0$ , F06UMF returns zero.  
*Constraint:*  $N \geq 0$ .

3: A(LDA,\*) – COMPLEX (KIND=nag\_wp) array Input

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

*On entry:* the  $n$  by  $n$  upper Hessenberg matrix  $A$ ; elements of the array below the first subdiagonal are not referenced.

4: LDA – INTEGER Input

*On entry:* the first dimension of the array A as declared in the (sub)program from which F06UMF is called.

*Constraint:*  $LDA \geq \max(1, N)$ .

5: WORK(\*) – REAL (KIND=nag\_wp) array Workspace

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

## 6 Error Indicators and Warnings

None.

## 7 Accuracy

Not applicable.

## 8 Parallelism and Performance

F06UMF is not threaded in any implementation.

## 9 Further Comments

None.

## 10 Example

None.

---