

NAG Library Routine Document

F06TYF

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

F06TYF applies to a complex rectangular matrix a sequence of plane rotations having real sines and complex cosines.

2 Specification

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SUBROUTINE F06TYF (SIDE, PIVOT, DIRECT, M, N, K1, K2, C, S, A, LDA)
INTEGER                M, N, K1, K2, LDA
REAL (KIND=nag_wp)    S(*)
COMPLEX (KIND=nag_wp) C(*), A(LDA,*)
CHARACTER(1)          SIDE, PIVOT, DIRECT
```

3 Description

F06TYF performs the transformation

$$A \leftarrow PA \quad \text{or} \quad A \leftarrow AP^H,$$

where A is an m by n complex matrix and P is a complex unitary matrix, defined as a sequence of complex plane rotations, P_k , with real sines, applied in planes k_1 to k_2 .

The 2 by 2 plane rotation part of P_k is assumed to have the form

$$\begin{pmatrix} \bar{c}_k & s_k \\ -s_k & c_k \end{pmatrix}$$

with s_k real.

4 References

None.

5 Arguments

- 1: SIDE – CHARACTER(1) *Input*
On entry: specifies whether A is operated on from the left or the right.
 SIDE = 'L'
 A is pre-multiplied from the left.
 SIDE = 'R'
 A is post-multiplied from the right.
Constraint: SIDE = 'L' or 'R'.
- 2: PIVOT – CHARACTER(1) *Input*
On entry: specifies the plane rotated by P_k .
 PIVOT = 'V' (variable pivot)
 P_k rotates the $(k, k + 1)$ plane.

- PIVOT = 'T' (top pivot)
 P_k rotates the $(k_1, k + 1)$ plane.
- PIVOT = 'B' (bottom pivot)
 P_k rotates the (k, k_2) plane.
- Constraint:* PIVOT = 'V', 'T' or 'B'.
- 3: DIRECT – CHARACTER(1) *Input*
On entry: specifies the sequence direction.
 DIRECT = 'F' (forward sequence)
 $P = P_{k_2-1} \cdots P_{k_1+1} P_{k_1}$.
 DIRECT = 'B' (backward sequence)
 $P = P_{k_1} P_{k_1+1} \cdots P_{k_2-1}$.
Constraint: DIRECT = 'F' or 'B'.
- 4: M – INTEGER *Input*
On entry: m , the number of rows of the matrix A .
Constraint: $M \geq 0$.
- 5: N – INTEGER *Input*
On entry: n , the number of columns of the matrix A .
Constraint: $N \geq 0$.
- 6: K1 – INTEGER *Input*
 7: K2 – INTEGER *Input*
On entry: the values k_1 and k_2 .
 If $K1 < 1$ or $K2 \leq K1$, or $SIDE = 'L'$ and $K2 > M$, or $SIDE = 'R'$ and $K2 > N$, an immediate return is effected.
- 8: C(*) – COMPLEX (KIND=nag_wp) array *Input*
Note: the dimension of the array C must be at least $K2 - K1$.
On entry: $C(k)$ must hold c_k , the cosine of the rotation P_k , for $k = k_1, \dots, k_2 - 1$.
- 9: S(*) – REAL (KIND=nag_wp) array *Input*
Note: the dimension of the array S must be at least $K2 - K1$.
On entry: $S(k)$ must hold s_k , the sine of the rotation P_k , for $k = k_1, \dots, k_2 - 1$.
- 10: A(LDA,*) – COMPLEX (KIND=nag_wp) array *Input/Output*
Note: the second dimension of the array A must be at least N .
On entry: the m by n matrix A .
On exit: the transformed matrix A .
- 11: LDA – INTEGER *Input*
On entry: the first dimension of the array A as declared in the (sub)program from which F06TYF is called.
Constraint: $LDA \geq \max(1, M)$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

F06TYF is not threaded in any implementation.

9 Further Comments

None.

10 Example

None.
