

NAG Fortran Library Routine Document

F06QXF

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

F06QXF performs the transformation

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

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

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

$$\begin{pmatrix} c_k & s_k \\ -s_k & c_k \end{pmatrix}.$$

2 Specification

```
SUBROUTINE F06QXF (SIDE, PIVOT, DIRECT, M, N, K1, K2, C, S, A, LDA)
  INTEGER          M, N, K1, K2, LDA
  double precision C(*), S(*), A(LDA,*)
  CHARACTER*1     SIDE, PIVOT, DIRECT
```

3 Description

None.

4 References

None.

5 Parameters

1: SIDE – CHARACTER*1 *Input*

On entry: specifies whether A is operated on from the left or the right, as follows:

- if SIDE = 'L', A is pre-multiplied from the left;
- if 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 :

- if PIVOT = 'V' (variable pivot), P_k rotates the $(k, k + 1)$ plane;
- if PIVOT = 'T' (top pivot), P_k rotates the $(k_1, k + 1)$ plane;
- if 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:
 if DIRECT = 'F' (forward sequence), $P = P_{k_2-1} \cdots P_{k_1+1} P_{k_1}$;
 if 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 .
- 8: C(*) – **double precision** array *Input*
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(*) – **double precision** array *Input*
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,*) – **double precision** array *Input/Output*
Note: the second dimension of the array A must be at least $\max(1, N)$.
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 F06QXF is called.
Constraint: $LDA \geq \max(1, M)$.

6 Error Indicators and Warnings

None.
