NAG Fortran Library Routine Document

F06FQF

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

F06FQF generates the parameters of a real orthogonal matrix P, of order $n+1$, chosen so as to set to zero the elements of a supplied n element real vector x.

If PIVOT = 'F' and DIRECT = 'F', or if PIVOT = 'V' and DIRECT = 'B',

$$P\begin{pmatrix}\alpha\\ x\end{pmatrix} = \begin{pmatrix}\beta\\ 0\end{pmatrix};$$

If PIVOT = 'F' and DIRECT = 'B', or if PIVOT = 'V' and DIRECT = 'F',

$$P\begin{pmatrix}x\\ \alpha\end{pmatrix} = \begin{pmatrix}0\\ \beta\end{pmatrix}.$$

Here α and β are real scalars.

P is represented as a sequence of n plane rotations P_k, as specified by PIVOT and DIRECT; P_k is chosen to annihilate x_k, and its 2 by 2 plane rotation part has the form

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

The tangent of the rotation, t_k, is overwritten on x_k.

2 Specification

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SUBROUTINE F06FQF (PIVOT, DIRECT, N, ALPHA, X, INCX, C, S)
INTEGER             N, INCX
double precision    ALPHA, X(*), C(*), S(*)
CHARACTER*1         PIVOT, DIRECT
```

3 Description

None.

4 References

None.

5 Parameters

1: 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 = 'F' (fixed pivot), P_k rotates the $(1, k+1)$ plane if DIRECT = 'F', or the $(k, n+1)$ plane if DIRECT = 'B'.

Constraint: PIVOT = 'V' or 'F'.

2: DIRECT – CHARACTER*1 *Input*

On entry: specifies the sequence direction:

if DIRECT = 'F' (forward sequence), $P = P_n \cdots P_2 P_1$;
if DIRECT = 'B' (backward sequence), $P = P_1 P_2 \cdots P_n$.

Constraint: DIRECT = 'F' or 'B'.

3: N – INTEGER *Input*

On entry: n, the number of elements in x.

4: ALPHA – ***double precision*** *Input/Output*

On entry: the scalar α.

On exit: the scalar β.

5: X($*$) – ***double precision*** array *Input/Output*

On entry: the vector x.

On exit: the tangents of the rotations P_k, for $k = 1, 2, \ldots, n$.

6: INCX – INTEGER *Input*

On entry: the increment in the subscripts of X between successive elements of x.

Constraint: INCX > 0.

7: C($*$) – ***double precision*** array *Output*

On exit: the values c_k, the cosines of the rotations.

8: S($*$) – ***double precision*** array *Output*

On exit: the values s_k, the sines of the rotations.

6 Error Indicators and Warnings

None.