NAG Fortran Library Routine Document

F06FRF

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

F06FRF generates details of a real elementary reflection (Householder matrix), P, such that

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

where P is orthogonal, α and β are real scalars, and x is an n element real vector.

P is given in the form

$$P = I - \begin{pmatrix}\zeta\\ z\end{pmatrix}(\zeta \quad z^T),$$

where z is an n element real vector and ζ is a real scalar.

If x is such that

$$\max|x_i| \leq \max(tol, \epsilon|\alpha|)$$

where ϵ is the ***machine precision*** and tol is a user-supplied tolerance, then ζ is set to 0, and P can be taken to be the unit matrix. Otherwise $1 \leq \zeta \leq \sqrt{2}$.

2 Specification

```
SUBROUTINE F06FRF (N, ALPHA, X, INCX, TOL, ZETA)
INTEGER             N, INCX
double precision    ALPHA, X(*), TOL, ZETA
```

3 Description

None.

4 References

None.

5 Parameters

1: N – INTEGER *Input*

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

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

On entry: the scalar α.

On exit: the scalar β.

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

On entry: the vector x.

On exit: the vector z.

4: INCX – INTEGER *Input*

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

Constraint: INCX > 0.

5: TOL – ***double precision*** *Input*

On entry: the value tol.

6: ZETA – ***double precision*** *Output*

On exit: the scalar ζ.

6 Error Indicators and Warnings

None.