NAG Fortran Library Routine Document

F06FSF

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

F06FSF 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

$$P = I - \frac{1}{\zeta}\begin{pmatrix}\zeta\\ z\end{pmatrix}\begin{pmatrix}\zeta & z^T\end{pmatrix},$$

where z is an n element real vector and ζ is a real scalar. (This form is compatible with that used by LINPACK.)

If the elements of x are all zero, or if the elements of x are all less than $tol \times |\alpha|$ in absolute value, then ζ is set to 0 and P can be taken to be the unit matrix. Otherwise ζ always lies in the range $(1, 2)$.

2 Specification

```
SUBROUTINE F06FSF (N, ALPHA, X, INCX, TOL, Z1)
INTEGER             N, INCX
double precision    ALPHA, X(*), TOL, Z1
```

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. If TOL is not in the range $(0, 1)$, then the value 0 is used for tol.

6: Z1 – ***double precision*** *Output*

On exit: the scalar ζ.

6 Error Indicators and Warnings

None.