

NAG 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 a real elementary reflection in the LINPACK (as opposed to NAG) style.

2 Specification

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

3 Description

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).

4 References

None.

5 Parameters

- | | | |
|----|--|---------------------|
| 1: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of elements in x and z . | |
| 2: | ALPHA – <i>double precision</i> | <i>Input/Output</i> |
| | <i>On entry:</i> the scalar α . | |
| | <i>On exit:</i> the scalar β . | |
| 3: | X(*) – <i>double precision</i> array | <i>Input/Output</i> |
| | Note: the dimension of the array X must be at least $\max(1, 1 + (N - 1) \text{INCX})$. | |
| | <i>On entry:</i> the vector x . | |
| | <i>On exit:</i> 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.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.
