

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

2 Specification

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

3 Description

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 $1 \leq \zeta \leq \sqrt{2}$.

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 $\max(1, 1 + (N - 1) INCX)$. | |
| | <i>On entry:</i> 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.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.
