

# NAG Library Routine Document

## F06FTF

**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

F06FTF applies a NAG (as opposed to LINPACK) style real elementary reflection to a real vector.

### 2 Specification

```
SUBROUTINE F06FTF (N, DELTA, Y, INCY, ZETA, Z, INCZ)
  INTEGER          N, INCY, INCZ
  REAL (KIND=nag_wp) DELTA, Y(*), ZETA, Z(*)
```

### 3 Description

F06FTF applies a real elementary reflection (Householder matrix)  $P$ , as generated by F06FRF, to a given real vector:

$$\begin{pmatrix} \delta \\ y \end{pmatrix} \leftarrow P \begin{pmatrix} \delta \\ y \end{pmatrix},$$

where  $y$  is an  $n$ -element real vector and  $\delta$  a real scalar.

### 4 References

None.

### 5 Arguments

- |    |   |                     |
|----|---|---------------------|
| 1: | N – INTEGER   | <i>Input</i>        |
|    | <i>On entry:</i> $n$ , the number of elements in $y$ and $z$ .  |                     |
| 2: | DELTA – REAL (KIND=nag_wp)  | <i>Input/Output</i> |
|    | <i>On entry:</i> the original scalar $\delta$ .   |                     |
|    | <i>On exit:</i> the transformed scalar $\delta$ .   |                     |
| 3: | Y(*) – REAL (KIND=nag_wp) array   | <i>Input/Output</i> |
|    | <b>Note:</b> the dimension of the array Y must be at least $\max(1, 1 + (N - 1) \times  \text{INCY} )$ .        |                     |
|    | <i>On entry:</i> the original vector $y$ .  |                     |
|    | If $\text{INCY} > 0$ , $y_i$ must be stored in $Y(1 + (i - 1) \times \text{INCY})$ , for $i = 1, 2, \dots, N$ . |                     |
|    | If $\text{INCY} < 0$ , $y_i$ must be stored in $Y(1 - (N - i) \times \text{INCY})$ , for $i = 1, 2, \dots, N$ . |                     |
|    | <i>On exit:</i> the transformed stored in the same array elements used to supply the original vector $y$ .      |                     |
| 4: | INCY – INTEGER  | <i>Input</i>        |
|    | <i>On entry:</i> the increment in the subscripts of Y between successive elements of $y$ .                      |                     |

- 5: ZETA – REAL (KIND=nag\_wp) *Input*  
*On entry:* the scalar  $\zeta$ , as returned by F06FRF.  
 If  $\zeta = 0$ ,  $P$  is assumed to be the unit matrix and the transformation is skipped.  
*Constraint:* if ZETA = 0.0, N = 0.
- 6: Z(\*) – REAL (KIND=nag\_wp) array *Input*  
**Note:** the dimension of the array Z must be at least  $\max(1, 1 + (N - 1) \times |\text{INCZ}|)$ .  
*On entry:* the vector  $z$ , as returned by F06FRF.  
 If  $\text{INCZ} > 0$ ,  $z_i$  must be stored in  $Z(1 + (i - 1) \times \text{INCZ})$ , for  $i = 1, 2, \dots, N$ .  
 If  $\text{INCZ} < 0$ ,  $z_i$  must be stored in  $Z(1 - (N - i) \times \text{INCZ})$ , for  $i = 1, 2, \dots, N$ .
- 7: INCZ – INTEGER *Input*  
*On entry:* the increment in the subscripts of Z between successive elements of  $z$ .

## 6 Error Indicators and Warnings

None.

## 7 Accuracy

Not applicable.

## 8 Parallelism and Performance

F06FTF makes calls to BLAS and/or LAPACK routines, which may be threaded within the vendor library used by this implementation. Consult the documentation for the vendor library for further information.

Please consult the X06 Chapter Introduction for information on how to control and interrogate the OpenMP environment used within this routine. Please also consult the Users' Note for your implementation for any additional implementation-specific information.

## 9 Further Comments

None.

## 10 Example

None.

---