

NAG Library Routine Document

F06FCF

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

F06FCF multiplies a real vector by a real diagonal matrix.

2 Specification

```
SUBROUTINE F06FCF (N, D, INCD, X, INCX)
```

```
INTEGER          N, INCD, INCX
```

```
REAL (KIND=nag_wp) D(*), X(*)
```

3 Description

F06FCF performs the operation

$$x \leftarrow Dx$$

where x is an n -element real vector and $D = \text{diag}(d)$ is a real diagonal matrix.

Equivalently, the routine performs the element-by-element product of the vectors x and d

$$x_i = d_i x_i, \quad i = 1, 2, \dots, n.$$

4 References

None.

5 Parameters

- | | | |
|----|---|---------------------|
| 1: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of elements in d and x . | |
| 2: | D(*) – REAL (KIND=nag_wp) array | <i>Input</i> |
| | Note: the dimension of the array D must be at least $\max(1, 1 + (N - 1) \times \text{INCD})$. | |
| | <i>On entry:</i> the vector d . | |
| | If $\text{INCD} > 0$, d_i must be stored in $D(1 + (i - 1) \times \text{INCD})$, for $i = 1, 2, \dots, N$. | |
| | If $\text{INCD} < 0$, d_i must be stored in $D(1 - (N - i) \times \text{INCD})$, for $i = 1, 2, \dots, N$. | |
| 3: | INCD – INTEGER | <i>Input</i> |
| | <i>On entry:</i> the increment in the subscripts of D between successive elements of d . | |
| 4: | X(*) – REAL (KIND=nag_wp) array | <i>Input/Output</i> |
| | Note: the dimension of the array X must be at least $\max(1, 1 + (N - 1) \times \text{INCX})$. | |
| | <i>On entry:</i> the array X must contain the n -element vector x . | |
| | If $\text{INCX} > 0$, x_i must be stored in $X(1 + (i - 1) \times \text{INCX})$, for $i = 1, 2, \dots, N$. | |
| | If $\text{INCX} < 0$, x_i must be stored in $X(1 - (N - i) \times \text{INCX})$, for $i = 1, 2, \dots, N$. | |

On exit: the updated vector x stored in the array elements used to supply the original vector x .
Intermediate elements of X are unchanged.

5: INCX – INTEGER

Input

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

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.
