

# NAG Library Routine Document

## F06FKF

**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

F06FKF computes the weighted Euclidean norm of a real vector.

### 2 Specification

```
FUNCTION F06FKF (N, W, INCW, X, INCX)
REAL (KIND=nag_wp) F06FKF
INTEGER          N, INCW, INCX
REAL (KIND=nag_wp) W(*), X(*)
```

### 3 Description

F06FKF returns, via the function name, the weighted Euclidean norm

$$\sqrt{x^T W x}$$

of the  $n$ -element real vector  $x$  scattered with stride INCW and INCX respectively, where  $W = \text{diag}(w)$  and  $w$  is a vector of weights scattered with stride INCW.

### 4 References

None.

### 5 Arguments

- |    |   |              |
|----|---|--------------|
| 1: | N – INTEGER   | <i>Input</i> |
|    | <i>On entry:</i> $n$ , the number of elements in $x$ .  |              |
| 2: | W(*) – REAL (KIND=nag_wp) array   | <i>Input</i> |
|    | <b>Note:</b> the dimension of the array W must be at least $\max(1, 1 + (N - 1) \times  \text{INCW} )$ .        |              |
|    | <i>On entry:</i> $w$ , the vector of weights.   |              |
|    | If $\text{INCW} > 0$ , $w_i$ must be stored in $W(1 + (i - 1) \times \text{INCW})$ , for $i = 1, 2, \dots, N$ . |              |
|    | If $\text{INCW} < 0$ , $w_i$ must be stored in $W(1 - (N - i) \times \text{INCW})$ , for $i = 1, 2, \dots, N$ . |              |
|    | <i>Constraint:</i> All weights must be non-negative.  |              |
| 3: | INCW – INTEGER  | <i>Input</i> |
|    | <i>On entry:</i> the increment in the subscripts of W between successive elements of $w$ .                      |              |
| 4: | X(*) – REAL (KIND=nag_wp) array   | <i>Input</i> |
|    | <b>Note:</b> the dimension of the array X must be at least $\max(1, 1 + (N - 1) \times  \text{INCX} )$ .        |              |
|    | <i>On entry:</i> 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 $i = 1, 2, \dots, N$ . |              |

Intermediate elements of X are not referenced.

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 Parallelism and Performance

F06FKF is not threaded in any implementation.

## 9 Further Comments

None.

## 10 Example

None.

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