NAG Fortran Library Routine Document

F06FJF

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

Given an n element real vector x, and real scalars α and ξ, F06FJF returns updated values $\tilde{\alpha}$ and $\tilde{\xi}$ such that

$$\tilde{\alpha}^2\tilde{\xi} = x_1^2 + x_2^2 + \cdots + x_n^2 + \alpha^2\xi.$$

F06FJF is designed for use in the safe computation of the Euclidean norm of a real vector, without unnecessary overflow or destructive underflow. An initial call to F06FJF (with $\xi = 1$ and $\alpha = 0$) may be followed by further calls to F06FJF and finally a call to F06BMF to complete the computation. Multiple calls of F06FJF may be needed if the elements of the vector cannot all be accessed in a single array X.

2 Specification

```
SUBROUTINE F06FJF (N, X, INCX, SCAL, SUMSQ)
INTEGER             N, INCX
double precision    X(*), SCAL, SUMSQ
```

3 Description

None.

4 References

None.

5 Parameters

1: N – INTEGER *Input*

On entry: n, the number of elements in x.

2: X($*$) – ***double precision*** array *Input*

On entry: the vector x.

3: INCX – INTEGER *Input*

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

Constraint: INCX > 0.

4: SCAL – ***double precision*** *Input/Output*

On entry: the scaling factor α.

Constraint: SCAL ≥ 0.

On exit: the updated scaling factor $\tilde{\alpha} = \max_i(\alpha, |x_i|)$.

5: SUMSQ – ***double precision*** *Input/Output*

On entry: the scaled sum of squares ξ.

Constraint: SUMSQ ≥ 1.

On exit: the updated scaled sum of squares $\tilde{\xi}$, satisfying: $1 \leq \tilde{\xi} \leq \xi + n$.

6 Error Indicators and Warnings

None.