

NAG Library Routine Document

F06KJF

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

F06KJF updates the Euclidean norm of complex vector in scaled form.

2 Specification

```
SUBROUTINE F06KJF(N, X, INCX, SCAL, SUMSQ)
INTEGER          N, INCX
double precision SCAL, SUMSQ
complex*16      X(*)
```

3 Description

Given an n element complex vector x , and real scalars α and ξ , F06KJF returns updated values $\tilde{\alpha}$ and $\tilde{\xi}$ such that

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

F06KJF is designed for use in the safe computation of the Euclidean norm of a complex vector, without unnecessary overflow or destructive underflow. An initial call to F06KJF (with $\xi = 1$ and $\alpha = 0$) may be followed by further calls to F06KJF and finally a call to F06BMF to complete the computation. Multiple calls of F06KJF may be needed if the elements of the vector cannot all be accessed in a single array X.

4 References

None.

5 Parameters

- | | | |
|----|--|---------------------|
| 1: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of elements in x . | |
| 2: | X(*) – complex*16 array | <i>Input</i> |
| | Note: the dimension of the array X must be at least $1 + (N - 1) INCX $. | |
| | <i>On entry:</i> the incremented array X must contain the n element vector x . | |
| 3: | INCX – INTEGER | <i>Input</i> |
| | <i>On entry:</i> the increment in the subscripts of X between successive elements of x . | |
| | <i>Constraint:</i> $INCX > 0$. | |
| 4: | SCAL – double precision | <i>Input/Output</i> |
| | <i>On entry:</i> the scaling factor α . | |
| | <i>Constraint:</i> $SCAL \geq 0$. | |
| | <i>On exit:</i> the updated scaling factor $\tilde{\alpha} = \max_i(\alpha, \operatorname{Re}(x_i) , \operatorname{Im}(x_i))$. | |

5: SUMSQ – *double precision*

Input/Output

On entry: the scaled sum of squares ξ .

Constraint: $\text{SUMSQ} \geq 1$.

On exit: the updated scaled sum of squares $\tilde{\xi}$, satisfying: $1 \leq \tilde{\xi} \leq \xi + 2n$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.
