NAG Library Routine Document

F06SSF (ZHPR2)

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

F06SSF (ZHPR2) computes the rank-2 update of a complex Hermitian matrix stored in packed form.

2 Specification

```
SUBROUTINE F06SSF (UPLO, N, ALPHA, X, INCX, Y, INCY, AP)
INTEGER                 N, INCX, INCY
COMPLEX (KIND=nag_wp) ALPHA, X(*), Y(*), AP(*)
CHARACTER(1)            UPLO
```

The routine may be called by its BLAS name ***zhpr2***.

3 Description

F06SSF (ZHPR2) performs the Hermitian rank-2 update operation

$$A \leftarrow \alpha x y^{\mathrm{H}} + \bar{\alpha} y x^{\mathrm{H}} + A,$$

where A is an n by n complex Hermitian matrix, stored in packed form, x and y are n-element complex vectors, and α is a complex scalar.

4 References

None.

5 Arguments

1: UPLO – CHARACTER(1) *Input*

On entry: specifies whether the upper or lower triangular part of A is stored.

UPLO = 'U'
The upper triangular part of A is stored.

UPLO = 'L'
The lower triangular part of A is stored.

Constraint: UPLO = 'U' or 'L'.

2: N – INTEGER *Input*

On entry: n, the order of the matrix A.

Constraint: N ≥ 0.

3: ALPHA – COMPLEX (KIND=nag_wp) *Input*

On entry: the scalar α.

4: X$(*)$ – COMPLEX (KIND=nag_wp) array *Input*

Note: the dimension of the array X must be at least $\max(1, 1 + (\mathrm{N} - 1) \times |\mathrm{INCX}|)$.

On entry: the n-element vector x.

If INCX > 0, x_i must be stored in X$(1 + (i-1) \times$ INCX$)$, for $i = 1, 2, \ldots,$ N.

If INCX < 0, x_i must be stored in X$(1 - ($N$ - i) \times$ INCX$)$, for $i = 1, 2, \ldots,$ 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.

Constraint: INCX $\neq 0$.

6: Y$(*)$ – COMPLEX (KIND=nag_wp) array *Input*

Note: the dimension of the array Y must be at least max$(1, 1 + ($N$ - 1) \times |$INCY$|)$.

On entry: the n-element vector y.

If INCY > 0, y_i must be stored in Y$(1 + (i-1) \times$ INCY$)$, for $i = 1, 2, \ldots,$ N.

If INCY < 0, y_i must be stored in Y$(1 - ($N$ - i) \times$ INCY$)$, for $i = 1, 2, \ldots,$ N.

Intermediate elements of Y are not referenced.

7: INCY – INTEGER *Input*

On entry: the increment in the subscripts of Y between successive elements of y.

Constraint: INCY $\neq 0$.

8: AP$(*)$ – COMPLEX (KIND=nag_wp) array *Input/Output*

Note: the dimension of the array AP must be at least N $\times$ (N $+ 1)/2$.

On entry: the n by n Hermitian matrix A, packed by columns.

More precisely,

if UPLO = 'U', the upper triangle of A must be stored with element A_{ij} in AP$(i + j(j-1)/2)$ for $i \leq j$;

if UPLO = 'L', the lower triangle of A must be stored with element A_{ij} in AP$(i + (2n - j)(j-1)/2)$ for $i \geq j$.

On exit: the updated matrix A. The imaginary parts of the diagonal elements are set to zero.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

F06SSF (ZHPR2) is not threaded in any implementation.

9 Further Comments

None.

10 Example

None.