NAG Library Routine Document

F06SPF (ZHER)

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

F06SPF (ZHER) computes the rank-1 update of a complex Hermitian matrix.

2 Specification

```
SUBROUTINE F06SPF (UPLO, N, ALPHA, X, INCX, A, LDA)
INTEGER                 N, INCX, LDA
REAL (KIND=nag_wp)      ALPHA
COMPLEX (KIND=nag_wp) X(*), A(LDA,*)
CHARACTER(1)            UPLO
```

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

3 Description

F06SPF (ZHER) performs the Hermitian rank-1 update operation

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

where A is an n by n complex Hermitian matrix, x is an n-element complex vector, and α is a real scalar.

4 References

None.

5 Parameters

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 – REAL (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 $\mathrm{X}(1 + (i - 1) \times \mathrm{INCX})$, for $i = 1, 2, \ldots, \mathrm{N}$.

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

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: A(LDA, ∗) – COMPLEX (KIND=nag_wp) array *Input/Output*

Note: the second dimension of the array A must be at least $\max(1, \mathrm{N})$.

On entry: the n by n Hermitian matrix A.

If UPLO = 'U', the upper triangular part of A must be stored and the elements of the array below the diagonal are not referenced.

If UPLO = 'L', the lower triangular part of A must be stored and the elements of the array above the diagonal are not referenced.

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

7: LDA – INTEGER *Input*

On entry: the first dimension of the array A as declared in the (sub)program from which F06SPF (ZHER) is called.

Constraint: LDA $\geq \max(1, \mathrm{N})$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

None.