NAG Fortran Library Routine Document

F06ZPF (ZHERK)

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

F06ZPF (ZHERK) performs one of the Hermitian rank-k update operations

$$C \leftarrow \alpha AA^H + \beta C \quad \text{or} \quad C \leftarrow \alpha A^H A + \beta C$$

where A is a complex matrix, C is an n by n complex Hermitian matrix, and α and β are real scalars.

2   Specification

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SUBROUTINE F06ZPF (UPLO, TRANS, N, K, ALPHA, A, LDA, BETA, C, LDC)
INTEGER            N, K, LDA, LDC
double precision   ALPHA, BETA
complex*16         A(LDA,*), C(LDC,*)
CHARACTER*1        UPLO, TRANS
```

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

3   Description

None.

4   References

None.

5   Parameters

1:    UPLO – CHARACTER*1   *Input*

On entry: specifies whether the upper or lower triangular part of C is stored as follows:

if UPLO = 'U', the upper triangular part of C is stored;
if UPLO = 'L', the lower triangular part of C is stored.

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

2:    TRANS – CHARACTER*1   *Input*

On entry: specifies the operation to be performed as follows:

if TRANS = 'N', $C \leftarrow \alpha AA^H + \beta C$;
if TRANS = 'C', $C \leftarrow \alpha A^H A + \beta C$.

Constraint: TRANS = 'N' or 'C'.

3:    N – INTEGER   *Input*

On entry: n, the order of the matrix C; the number of rows of A if TRANS = 'N', or the number of columns of A otherwise.

Constraint: N $\geq$ 0.

4:      K – INTEGER   *Input*

On entry: k, the number of columns of A if TRANS = 'N', or the number of rows of A otherwise.

Constraint: $K \geq 0$.

5:      ALPHA – ***double precision***   *Input*

On entry: the scalar α.

6:      A(LDA,∗) – ***complex*16*** array   *Input*

Note: the second dimension of the array A must be at least $\max(1, K)$ if TRANS = 'N' and at least $\max(1, N)$ otherwise.

On entry: the matrix A; A is n by k if TRANS = 'N', or k by n otherwise.

7:      LDA – INTEGER   *Input*

On entry: the first dimension of the array A as declared in the (sub)program from which F06ZPF (ZHERK) is called.

Constraint: LDA $\geq \max(1, N)$ if TRANS = 'N'; LDA $\geq \max(1, K)$ otherwise.

8:      BETA – ***double precision***   *Input*

On entry: the scalar β.

9:      C(LDC,∗) – ***complex*16*** array   *Input/Output*

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

On entry: the n by n Hermitian matrix C. If UPLO = 'U', the upper triangle of C must be stored and the elements of the array below the diagonal are not referenced; if UPLO = 'L', the lower triangle of C must be stored and the elements of the array above the diagonal are not referenced.

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

10:     LDC – INTEGER   *Input*

On entry: the first dimension of the array C as declared in the (sub)program from which F06ZPF (ZHERK) is called.

Constraint: LDC $\geq \max(1, N)$.

6   Error Indicators and Warnings

None.