NAG 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

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

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
REAL (KIND=nag_wp)   ALPHA, BETA
COMPLEX (KIND=nag_wp) 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.

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

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.

TRANS = 'N'
      $C \leftarrow \alpha AA^{\mathrm{H}} + \beta C$.

TRANS = 'C'
      $C \leftarrow \alpha A^{\mathrm{H}}A + \beta C$.

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 if TRANS = 'C'.

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 if TRANS = 'C'.

Constraint: $K \geq 0$.

5:     ALPHA – REAL (KIND=nag_wp)   *Input*

On entry: the scalar α.

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

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

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

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.

Constraints:

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

8:     BETA – REAL (KIND=nag_wp)   *Input*

On entry: the scalar β.

9:     C(LDC, ∗) – COMPLEX (KIND=nag_wp) 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 triangular part of C must be stored and the elements of the array below the diagonal are not referenced.

     If UPLO = 'L', the lower triangular part 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.

7   Accuracy

Not applicable.

8   Parallelism and Performance

Not applicable.

9   Further Comments

None.

10   Example

None.