NAG Fortran Library Routine Document

F06ZUF (ZSYRK)

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

F06ZUF (ZSYRK) performs one of the symmetric rank-k update operations

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

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

2　Specification

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SUBROUTINE F06ZUF (UPLO, TRANS, N, K, ALPHA, A, LDA, BETA, C, LDC)
INTEGER           N, K, LDA, LDC
complex*16        ALPHA, A(LDA,*), BETA, C(LDC,*)
CHARACTER*1       UPLO, TRANS
```

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

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', $C \leftarrow \alpha A A^T + \beta C$;
　　if TRANS = 'T', $C \leftarrow \alpha A^T A + \beta C$.

Constraint: TRANS = 'N' or 'T'.

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 – ***complex*16***   *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 F06ZUF (ZSYRK) is called.

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

8:    BETA – ***complex*16***   *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 symmetric 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.

10:    LDC – INTEGER   *Input*

On entry: the first dimension of the array C as declared in the (sub)program from which F06ZUF (ZSYRK) is called.

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

6   Error Indicators and Warnings

None.