

NAG Fortran Library Routine Document

F06YJF (DTRSM)

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

F06YJF (DTRSM) performs one of the matrix-matrix operations

$$\begin{array}{ll} B \leftarrow \alpha A^{-1} B, & B \leftarrow \alpha A^{-T} B, \\ B \leftarrow \alpha B A^{-1} & \text{or } B \leftarrow \alpha B A^{-T}, \end{array}$$

where A is a real triangular matrix, B is an m by n real matrix, and α is a real scalar. A^{-T} denotes $(A^T)^{-1}$ or equivalently $(A^{-1})^T$.

No test for singularity or near-singularity of A is included in this routine. Such tests must be performed before calling this routine.

2 Specification

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SUBROUTINE F06YJF (SIDE, UPLO, TRANSA, DIAG, M, N, ALPHA, A, LDA, B,
1                      LDB)
    INTEGER          M, N, LDA, LDB
    double precision ALPHA, A(LDA,*), B(LDB,*)
    CHARACTER*1      SIDE, UPLO, TRANSA, DIAG
```

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

3 Description

None.

4 References

None.

5 Parameters

- 1: SIDE – CHARACTER*1 *Input*
On entry: specifies whether B is operated on from the left or the right, as follows:
 if SIDE = 'L', B is pre-multiplied from the left;
 if SIDE = 'R', B is post-multiplied from the right.
Constraint: SIDE = 'L' or 'R'.
- 2: UPLO – CHARACTER*1 *Input*
On entry: specifies whether A is upper or lower triangular as follows:
 if UPLO = 'U', A is upper triangular;
 if UPLO = 'L', A is lower triangular.
Constraint: UPLO = 'U' or 'L'.

- 3: TRANSA – CHARACTER*1 *Input*
On entry: specifies whether the operation involves A^{-1} or A^{-T} , as follows:
 if TRANSA = 'N', it involves A^{-1} ;
 if TRANSA = 'T' or 'C', it involves A^{-T} .
Constraint: TRANSA = 'N', 'T' or 'C'.
- 4: DIAG – CHARACTER*1 *Input*
On entry: specifies whether A has non-unit or unit diagonal elements, as follows:
 if DIAG = 'N', the diagonal elements are stored explicitly;
 if DIAG = 'U', the diagonal elements are assumed to be 1, and are not referenced.
Constraint: DIAG = 'N' or 'U'.
- 5: M – INTEGER *Input*
On entry: m , the number of rows of the matrix B ; the order of A if SIDE = 'L'.
Constraint: $M \geq 0$.
- 6: N – INTEGER *Input*
On entry: n , the number of columns of the matrix B ; the order of A if SIDE = 'R'.
Constraint: $N \geq 0$.
- 7: ALPHA – **double precision** *Input*
On entry: the scalar α .
- 8: A(LDA,*) – **double precision** array *Input*
Note: the second dimension of the array A must be at least $\max(1, M)$ if SIDE = 'L' and at least $\max(1, N)$ if SIDE = 'R'.
On entry: the triangular matrix A ; A is m by m if SIDE = 'L', or n by n if SIDE = 'R'. If UPLO = 'U', A is upper triangular and the elements of the array below the diagonal are not referenced; if UPLO = 'L', A is lower triangular and the elements of the array above the diagonal are not referenced. If DIAG = 'U', the diagonal elements of A are not referenced, but are assumed to be 1.
- 9: LDA – INTEGER *Input*
On entry: the first dimension of the array A as declared in the (sub)program from which F06YJF (DTRSM) is called.
Constraint: $LDA \geq \max(1, M)$ if SIDE = 'L'; $LDA \geq \max(1, N)$ if SIDE = 'R'.
- 10: B(LDB,*) – **double precision** array *Input/Output*
Note: the second dimension of the array B must be at least $\max(1, N)$.
On entry: the m by n matrix B . If ALPHA = 0, B need not be set.
On exit: the updated matrix B .
- 11: LDB – INTEGER *Input*
On entry: the first dimension of the array B as declared in the (sub)program from which F06YJF (DTRSM) is called.
Constraint: $LDB \geq \max(1, M)$.

6 Error Indicators and Warnings

None.
