# NAG Fortran Library Routine Document

# F06YFF (DTRMM)

**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

F06YFF (DTRMM) performs one of the matrix-matrix operations

$$B \leftarrow \alpha AB, \qquad B \leftarrow \alpha A^T B,$$
$$B \leftarrow \alpha BA \quad \text{or} \quad B \leftarrow \alpha BA^T,$$

where $B$ is an $m$ by $n$ real matrix, $A$ is a real triangular matrix, and $\alpha$ is a real scalar.

## 2 Specification

```
SUBROUTINE F06YFF (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 ***dtrmm***.

## 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 $A$ or $A^T$, as follows:

if TRANSA = 'N', it involves $A$;
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*: $\mathrm{M} \geq 0$.

6: N – INTEGER *Input*

*On entry*: $n$, the number of columns of the matrix $B$; the order of $A$ if SIDE = 'R'.

*Constraint*: $\mathrm{N} \geq 0$.

7: ALPHA – ***double precision*** *Input*

*On entry*: the scalar $\alpha$.

8: A(LDA,$*$) – ***double precision*** array *Input*

**Note**: the second dimension of the array A must be at least $\max(1,\mathrm{M})$ if SIDE = 'L' and at least $\max(1,\mathrm{N})$ 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 F06YFF (DTRMM) is called.

*Constraint*: LDA $\geq \max(1,\mathrm{M})$ if SIDE = 'L'; LDA $\geq \max(1,\mathrm{N})$ if SIDE = 'R'.

10: B(LDB,$*$) – ***double precision*** array *Input/Output*

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

*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 F06YFF (DTRMM) is called.

*Constraint*: LDB $\geq \max(1,\mathrm{M})$.

## 6 Error Indicators and Warnings

None.