NAG Library Routine Document

F06PFF (DTRMV)

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

F06PFF (DTRMV) computes the matrix-vector product for a real triangular matrix or its transpose.

2 Specification

```
SUBROUTINE F06PFF (UPLO, TRANS, DIAG, N, A, LDA, X, INCX)
INTEGER            N, LDA, INCX
REAL (KIND=nag_wp) A(LDA,*), X(*)
CHARACTER(1)       UPLO, TRANS, DIAG
```

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

3 Description

F06PFF (DTRMV) performs one of the matrix-vector operations

$$x \leftarrow Ax \quad \text{or} \quad x \leftarrow A^{\mathrm{T}}x,$$

where A is an n by n real triangular matrix, and x is an n-element real vector.

4 References

None.

5 Parameters

1: UPLO – CHARACTER(1) *Input*

On entry: specifies whether A is upper or lower triangular.

UPLO = 'U'
A is upper triangular.

UPLO = 'L'
A is lower triangular.

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

2: TRANS – CHARACTER(1) *Input*

On entry: specifies the operation to be performed.

TRANS = 'N'
$x \leftarrow Ax$.

TRANS = 'T' or 'C'
$x \leftarrow A^{\mathrm{T}}x$.

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

3: DIAG – CHARACTER(1) *Input*

On entry: specifies whether A has nonunit or unit diagonal elements.

DIAG = 'N'
The diagonal elements are stored explicitly.

DIAG = 'U'
The diagonal elements are assumed to be 1, and are not referenced.

Constraint: DIAG = 'N' or 'U'.

4: N – INTEGER *Input*

On entry: n, the order of the matrix A.

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

5: A(LDA, $*$) – REAL (KIND=nag_wp) array *Input*

Note: the second dimension of the array A must be at least N.

On entry: the n by n triangular matrix A.

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 assumed to be 1, and are not referenced.

6: LDA – INTEGER *Input*

On entry: the first dimension of the array A as declared in the (sub)program from which F06PFF (DTRMV) is called.

Constraint: $\mathrm{LDA} \geq \max(1, \mathrm{N})$.

7: X($*$) – REAL (KIND=nag_wp) array *Input/Output*

Note: the dimension of the array X must be at least $\max(1, 1 + (\mathrm{N} - 1) \times |\mathrm{INCX}|)$.

On entry: the n-element vector x.

If INCX > 0, x_i must be stored in X$(1 + (i-1) \times \mathrm{INCX})$, for $i = 1, 2, \ldots, \mathrm{N}$.

If INCX < 0, x_i must be stored in X$(1-(\mathrm{N}-i) \times \mathrm{INCX})$, for $i = 1, 2, \ldots, \mathrm{N}$.

On exit: the updated vector x stored in the array elements used to supply the original vector x.

8: INCX – INTEGER *Input*

On entry: the increment in the subscripts of X between successive elements of x.

Constraint: INCX $\neq 0$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

None.