NAG Library Routine Document

F06PJF (DTRSV)

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

F06PJF (DTRSV) solves a real triangular system of equations with a single right hand side.

2 Specification

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SUBROUTINE F06PJF (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 **dtrsv**.

3 Description

F06PJF (DTRSV) performs one of the matrix-vector operations

$$x \leftarrow A^{-1}x \quad \text{or} \quad x \leftarrow A^{-T}x,$$

where A is an n by n real triangular matrix, and x is an n-element real vector. A^{-T} denotes $\left(A^{T}\right)^{-1}$ or equivalently $\left(A^{-1}\right)^{T}$.

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

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'
        $x \leftarrow A^{-1}x$.

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

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: 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 F06PJF (DTRSV) is called.

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

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

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

On entry: the n-element vector x.

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

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