NAG C Library Function Document

dtrsv (f06pjc)

1 Purpose

dtrsv (f06pjc) performs one of the matrix-vector operations

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

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

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

2 Specification

```
#include <nag.h>
#include <nagf06.h>
void dtrsv (MatrixTriangle uplo, MatrixTranspose trans, MatrixUnitTriangular diag,
     Integer n, const double a[], Integer tda, double x[], Integer incx)
```

3 Arguments

1: **uplo** – MatrixTriangle *Input*

On entry: specifies whether A upper or lower triangular as follows:

if **uplo** = **UpperTriangle**, A is upper triangular;
if **uplo** = **LowerTriangle**, A is lower triangular.

Constraint: **uplo** = **UpperTriangle** or **LowerTriangle**.

2: **trans** – MatrixTranspose *Input*

On entry: specifies the operation to be performed as follows:

if **trans** = **NoTranspose**, $x \leftarrow Ax$;
if **trans** = **Transpose** or **ConjugateTranspose**, $x \leftarrow A^{\mathrm{T}}x$.

Constraint: **trans** = **NoTranspose**, **Transpose** or **ConjugateTranspose**.

3: **diag** – MatrixUnitTriangular *Input*

On entry: specifies whether A has non-unit or unit diagonal elements, as follows:

if **diag** = **NotUnitTriangular**, the diagonal elements are stored explicitly;
if **diag** = **UnitTriangular**, the diagonal elements are assumed to be 1, and are not referenced.

Constraint: **diag** = **NotUnitTriangular** or **UnitTriangular**.

4: **n** – Integer *Input*

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

Constraint: **n** ≥ 0.

5: **a**[**n** × **tda**] – const double *Input*

On entry: the n by n triangular matrix A.

uplo = **UpperTriangle**

A is upper triangular and the elements of the array below the diagonal are not referenced.

uplo = **LowerTriangle**

A is lower triangular and the elements of the array above the diagonal are not referenced.

diag = **UnitTriangular**

The diagonal elements of *A* are not referenced, but are assumed to be 1.

6: **tda** – Integer *Input*

On entry: the second dimension of the array **a** as declared in the function from which dtrsv (f06pjc) is called.

Constraint: **tda** $\geq \max(1, \mathbf{n})$.

7: **x**[**n**] – double *Input/Output*

On entry: the vector *x* of length *n*.

On exit: the updated vector *x*.

8: **incx** – Integer *Input*

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

Constraint: **incx** $\neq 0$.

4 Error Indicators and Warnings

If a function is called with an invalid argument then an error message is output on stderr, giving the name of the function and the number of the first invalid argument, and execution is terminated.