NAG C Library Function Document

dtpmv (f06phc)

1 Purpose

dtpmv (f06phc) performs one of the matrix-vector operations

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

where A is an n by n real triangular matrix, stored in packed form, and x is an n element real vector.

2 Specification

```
#include <nag.h>
#include <nagf06.h>
void dtpmv (MatrixTriangle uplo, MatrixTranspose trans, MatrixUnitTriangular diag,
     Integer n, const double ap[], 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: $\mathbf{n} \geq 0$.

5: **ap**[dim] – const double *Input*

Note: the dimension, *dim*, of the array **ap** must be at least $\mathbf{n}(\mathbf{n}+1)/2$.

On entry: the n by n triangular matrix A, packed by rows. More precisely,

if **uplo** = **UpperTriangle**, the upper triangle of A must be stored with element a_{ij} in $\mathbf{ap}[j-1+(2n-i)(i-1)/2]$ for $i \leq j$;
if **uplo** = **LowerTriangle**, the lower triangle of A must be stored with element a_{ij} in $\mathbf{ap}[j-1+i(i-1)/2]$ for $j \leq i$.

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

On entry: the vector x of length n.

On exit: the updated vector x.

7: **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.