

NAG Library Routine Document

F06PLF (DTPSV)

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

F06PLF (DTPSV) 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, stored in packed form, and x is an n element real vector. A^{-T} denotes A^{-T} or equivalently A^{-T} .

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

2 Specification

```
SUBROUTINE F06PLF(UPLO, TRANS, DIAG, N, AP, X, INCX)
  INTEGER          N, INCX
  double precision AP(*), X(*)
  CHARACTER*1      UPLO, TRANS, DIAG
```

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

3 Description

None.

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: AP(*) – **double precision** array *Input*
Note: the dimension of the array AP must be at least $N \times (N + 1)/2$.
On entry: the n by n triangular matrix A , packed by columns.
 More precisely,
 if UPLO = 'U', the upper triangle of A must be stored with element A_{ij} in
 AP($i + j(j - 1)/2$) for $i \leq j$;
 if UPLO = 'L', the lower triangle of A must be stored with element A_{ij} in
 AP($i + (2n - j)(j - 1)/2$) for $i \geq j$.
 If DIAG = 'U', the diagonal elements of A are assumed to be 1, and are not referenced; the same
 storage scheme is used whether DIAG = 'N' or 'U'.
- 6: X(*) – **double precision** array *Input/Output*
Note: the dimension of the array X must be at least $1 + (N - 1)|\text{INCX}|$.
On entry: the incremented array X must contain the n element vector x .
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 $\neq 0$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.