NAG Fortran Library Routine Document

F06SLF (ZTPSV)

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

F06SLF (ZTPSV) performs one of the matrix-vector operations

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

where A is an n by n complex triangular matrix, stored in packed form, and x is an n element complex vector. A^{-T} denotes $\left(A^T\right)^{-1}$ or equivalently $\left(A^{-1}\right)^T$; A^{-H} denotes $\left(A^H\right)^{-1}$ or equivalently $\left(A^{-1}\right)^H$.

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 F06SLF (UPLO, TRANS, DIAG, N, AP, X, INCX)
INTEGER             N, INCX
complex*16          AP(*), X(*)
CHARACTER*1         UPLO, TRANS, DIAG
```

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

3 Description

None.

4 References

None.

5 Parameters

1: UPLO – CHARACTER*1 *Input*

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

if UPLO = 'U', A is upper triangular;
if UPLO = 'L', A is lower triangular.

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

2: TRANS – CHARACTER*1 *Input*

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

if TRANS = 'N', $x \leftarrow A^{-1}x$;
if TRANS = 'T', $x \leftarrow A^{-T}x$;
if TRANS = 'C', $x \leftarrow A^{-H}x$.

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

3: DIAG – CHARACTER*1 *Input*

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

if DIAG = 'N', the diagonal elements are stored explicitly;
if 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: AP$(*)$ – ***complex*16*** array *Input*

Note: the dimension of the array AP must be at least $\max(1, \mathrm{N} \times (\mathrm{N}+1)/2)$.

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 $\mathrm{AP}(i+j(j-1)/2)$ for $i \leq j$; if UPLO = 'L', the lower triangle of A must be stored with element a_{ij} in $\mathrm{AP}(i+(2n-j)(j-1)/2)$ 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$(*)$ – ***complex*16*** array *Input/Output*

On entry: the 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: $\mathrm{INCX} \neq 0$.

6 Error Indicators and Warnings

None.