

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 $(A^T)^{-1}$ or equivalently $(A^{-1})^T$; A^{-H} denotes $(A^H)^{-1}$ or equivalently $(A^{-1})^H$.

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: $N \geq 0$.
- 5: AP(*) – **complex*16** array *Input*
Note: the dimension of the array AP must be at least $\max(1, N \times (N + 1)/2)$.
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(*) – **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: INCX $\neq 0$.

6 Error Indicators and Warnings

None.
