

NAG 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.
 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'
 $x \leftarrow A^{-T}x$.

TRANS = 'C'

$$x \leftarrow A^{-H}x.$$

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(*) – **complex*16** 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(*) – **complex*16** array

Input/Output

Note: the dimension of the array X must be at least $1 + (N - 1)|INCX|$.

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.
