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) solves a complex triangular system of equations, stored in packed form, with a single right hand side.

2 Specification

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SUBROUTINE F06SLF (UPLO, TRANS, DIAG, N, AP, X, INCX)
INTEGER                 N, INCX
COMPLEX (KIND=nag_wp) AP(*), X(*)
CHARACTER(1)            UPLO, TRANS, DIAG
```

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

3 Description

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

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

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

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

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

TRANS = 'C'
$x \leftarrow A^{-\mathrm{H}}x$.

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 ≥ 0.

5: AP$(*)$ – COMPLEX (KIND=nag_wp) 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 (KIND=nag_wp) array *Input/Output*

Note: the dimension of the array X must be at least max$(1, 1 + (\mathrm{N}-1) \times |\mathrm{INCX}|)$.

On entry: the vector x.

If INCX > 0, x_i must be stored in X$(1 + (i-1) \times$ INCX), for $i = 1, 2, \ldots,$ N.

If INCX < 0, x_i must be stored in X$(1-(\mathrm{N}-i) \times$ INCX), for $i = 1, 2, \ldots,$ N.

On exit: the updated vector x stored in the array elements used to supply the original 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 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

None.