

NAG Library Routine Document

F06SKF (ZTBSV)

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

F06SKF (ZTBSV) 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 band matrix with k subdiagonals or superdiagonals, 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 F06SKF(UPLO, TRANS, DIAG, N, K, A, LDA, X, INCX)
  INTEGER          N, K, LDA, INCX
  complex*16      A(LDA,*), X(*)
  CHARACTER*1      UPLO, TRANS, DIAG
```

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

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: K – INTEGER *Input*

On entry: k , the number of subdiagonals or superdiagonals of the matrix A .

Constraint: $K \geq 0$.

6: A(LDA,*) – **complex*16** array *Input*

Note: the second dimension of the array A must be at least N .

On entry: the n by n triangular band matrix A

The matrix is stored in rows 1 to $k + 1$, more precisely,

if UPLO = 'U', the elements of the upper triangle of A within the band must be stored with element A_{ij} in $A(k + 1 + i - j, j)$ for $\max(1, j - k) \leq i \leq j$;

if UPLO = 'L', the elements of the lower triangle of A within the band must be stored with element A_{ij} in $A(1 + i - j, j)$ for $j \leq i \leq \min(n, j + k)$.

If DIAG = 'U', the diagonal elements of A are assumed to be 1, and are not referenced.

7: LDA – INTEGER *Input*

On entry: the first dimension of the array A as declared in the (sub)program from which F06SKF (ZTBSV) is called.

Constraint: $LDA \geq K + 1$.

8: 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 .

9: 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.
