

NAG Fortran 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 sub-diagonals or super-diagonals, 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 *zpbsv*.

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: K – INTEGER Input
On entry: k , the number of sub-diagonals or super-diagonals 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 $\max(1, N)$.
On entry: the n by n triangular band matrix A , 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 not referenced, but are assumed to be 1.
- 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
On entry: the 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.
