NAG Fortran Library Routine Document

F06PGF (DTBMV)

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

F06PGF (DTBMV) performs one of the matrix-vector operations

$$x \leftarrow Ax \quad \text{or} \quad x \leftarrow A^T x,$$

where A is an n by n real triangular band matrix with k sub-diagonals or super-diagonals, and x is an n element real vector.

2   Specification

```
SUBROUTINE F06PGF (UPLO, TRANS, DIAG, N, K, A, LDA, X, INCX)
INTEGER          N, K, LDA, INCX
double precision A(LDA,*), X(*)
CHARACTER*1      UPLO, TRANS, DIAG
```

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

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', $x \leftarrow Ax$;
      if TRANS = 'T' or 'C', $x \leftarrow A^T x$.

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,∗) – ***double precision*** 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 F06PGF (DTBMV) is called.

Constraint: $LDA \geq K + 1$.

8: X(∗) – ***double precision*** 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.