

NAG Fortran Library Routine Document

F06PBF (DGBMV)

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

F06PBF (DGBMV) performs one of the matrix-vector operations

$$y \leftarrow \alpha Ax + \beta y, \quad \text{or} \quad y \leftarrow \alpha A^T x + \beta y,$$

where A is an m by n real band matrix with k_l sub-diagonals and k_u super-diagonals, x and y are real vectors, and α and β are real scalars.

If $m = 0$ or $n = 0$, no operation is performed.

2 Specification

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SUBROUTINE F06PBF (TRANS, M, N, KL, KU, ALPHA, A, LDA, X, INCX, BETA, Y,
1                INCY)
    INTEGER          M, N, KL, KU, LDA, INCX, INCY
    double precision ALPHA, A(LDA,*), X(*), BETA, Y(*)
    CHARACTER*1     TRANS
  
```

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

3 Description

None.

4 References

None.

5 Parameters

- 1: TRANS – CHARACTER*1 *Input*
On entry: specifies the operation to be performed as follows:
 if TRANS = 'N', $y \leftarrow \alpha Ax + \beta y$;
 if TRANS = 'T' or 'C', $y \leftarrow \alpha A^T x + \beta y$.
Constraint: TRANS = 'N', 'T' or 'C'.
- 2: M – INTEGER *Input*
On entry: m , the number of rows of the matrix A .
Constraint: $M \geq 0$.
- 3: N – INTEGER *Input*
On entry: n , the number of columns of the matrix A .
Constraint: $N \geq 0$.

- 4: KL – INTEGER *Input*
On entry: k_l , the number of sub-diagonals within the band of A .
Constraint: $KL \geq 0$.
- 5: KU – INTEGER *Input*
On entry: k_u , the number of super-diagonals within the band of A .
Constraint: $KU \geq 0$.
- 6: ALPHA – *double precision* *Input*
On entry: the scalar α .
- 7: A(LDA,*) – *double precision* array *Input*
Note: the second dimension of the array A must be at least $\max(1, N)$.
On entry: the m by n band matrix A , stored in rows 1 to $k_l + k_u + 1$. More precisely, a_{ij} must be stored in $A(k_u + i - j + 1, j)$ for $\max(j - k_u, 1) \leq i \leq \min(j + k_l, m)$.
- 8: LDA – INTEGER *Input*
On entry: the first dimension of the array A as declared in the (sub)program from which F06PBF (DGBMV) is called.
Constraint: $LDA \geq KL + KU + 1$.
- 9: X(*) – *double precision* array *Input*
On entry: the vector x , of length n if TRANS = 'N', or of length m if TRANS = 'T' or 'C'.
- 10: INCX – INTEGER *Input*
On entry: the increment in the subscripts of X between successive elements of x .
Constraint: $INCX \neq 0$.
- 11: BETA – *double precision* *Input*
On entry: the scalar β .
- 12: Y(*) – *double precision* array *Input/Output*
On entry: the vector y , of length m if TRANS = 'N', or of length n if TRANS = 'T' or 'C'. If BETA = 0, Y need not be set.
On exit: the updated vector y .
- 13: INCY – INTEGER *Input*
On entry: the increment in the subscripts of Y between successive elements of y .
Constraint: $INCY \neq 0$.

6 Error Indicators and Warnings

None.
