

NAG 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 subdiagonals and k_u superdiagonals, 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

```
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 | <i>Input</i> |
| | <i>On entry:</i> specifies the operation to be performed. | |
| | TRANS = 'N' | |
| | $y \leftarrow \alpha Ax + \beta y.$ | |
| | TRANS = 'T' or 'C' | |
| | $y \leftarrow \alpha A^T x + \beta y.$ | |
| | <i>Constraint:</i> TRANS = 'N', 'T' or 'C'. | |
| 2: | M – INTEGER | <i>Input</i> |
| | <i>On entry:</i> m , the number of rows of the matrix A . | |
| | <i>Constraint:</i> $M \geq 0$. | |
| 3: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of columns of the matrix A . | |
| | <i>Constraint:</i> $N \geq 0$. | |

- 4: KL – INTEGER *Input*
On entry: k_l , the number of subdiagonals within the band of A .
Constraint: $KL \geq 0$.
- 5: KU – INTEGER *Input*
On entry: k_u , the number of superdiagonals 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 N .
On entry: the m by n band matrix A .
The matrix is stored in rows 1 to $k_l + k_u + 1$, more precisely, the element A_{ij} must be stored in

$$A(k_u + 1 + i - j, j) \quad \text{for } \max(1, j - k_u) \leq i \leq \min(m, j + k_l).$$
- 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*
Note: the dimension of the array X must be at least $1 + (N - 1)|INCX|$ if $TRANS = 'N'$ and at least $1 + (M - 1)|INCX|$ if $TRANS = 'T'$ or $'C'$.
On entry: the incremented array X must contain the vector x .
- 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*
Note: the dimension of the array Y must be at least $1 + (M - 1)|INCY|$ if $TRANS = 'N'$ and at least $1 + (N - 1)|INCY|$ if $TRANS = 'T'$ or $'C'$.
On entry: the incremented array Y must contain the vector y .
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.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.
