NAG Fortran Library Routine Document

F06PDF (DSBMV)

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

F06PDF (DSBMV) performs the matrix-vector operation

$$y \leftarrow \alpha Ax + \beta y,$$

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

2 Specification

```
SUBROUTINE F06PDF (UPLO, N, K, ALPHA, A, LDA, X, INCX, BETA, Y, INCY)
INTEGER             N, K, LDA, INCX, INCY
double precision    ALPHA, A(LDA,*), X(*), BETA, Y(*)
CHARACTER*1         UPLO
```

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

3 Description

None.

4 References

None.

5 Parameters

1: UPLO – CHARACTER*1 *Input*

On entry: specifies whether the upper or lower triangular part of A is stored as follows:

if UPLO $=$ 'U', the upper triangular part of A is stored;
if UPLO $=$ 'L', the lower triangular part of A is stored.

Constraint: UPLO $=$ 'U' or 'L'.

2: N – INTEGER *Input*

On entry: n, the order of the matrix A.

Constraint: N ≥ 0.

3: K – INTEGER *Input*

On entry: k, the number of sub-diagonals or super-diagonals of the matrix A.

Constraint: K ≥ 0.

4: ALPHA – ***double precision*** *Input*

On entry: the scalar α.

5: A(LDA,$*$) – ***double precision*** array *Input*

Note: the second dimension of the array A must be at least $\max(1, \mathrm{N})$.

On entry: the n by n symmetric 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 $\mathrm{A}(k+1+i-j, j)$ 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 $\mathrm{A}(1+i-j, j)$ for $j \leq i \leq \min(n, j+k)$.

6: LDA – INTEGER *Input*

On entry: the first dimension of the array A as declared in the (sub)program from which F06PDF (DSBMV) is called.

Constraint: $\mathrm{LDA} \geq \mathrm{K}+1$.

7: X($*$) – ***double precision*** array *Input*

On entry: the vector x.

8: INCX – INTEGER *Input*

On entry: the increment in the subscripts of X between successive elements of x.

Constraint: $\mathrm{INCX} \neq 0$.

9: BETA – ***double precision*** *Input*

On entry: the scalar β.

10: Y($*$) – ***double precision*** array *Input/Output*

On entry: the vector y. If $\mathrm{BETA} = 0$, Y need not be set.

On exit: the updated vector y.

11: INCY – INTEGER *Input*

On entry: the increment in the subscripts of Y between successive elements of y.

Constraint: $\mathrm{INCY} \neq 0$.

6 Error Indicators and Warnings

None.