

NAG C Library Function Document

dsbmv (f06pdc)

1 Purpose

dsbmv (f06pdc) 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

```
#include <nag.h>
#include <nagf06.h>
```

```
void dsbmv (MatrixTriangle uplo, Integer n, Integer k, double alpha,
           const double a[], Integer tda, const double x[], Integer incx, double beta,
           double y[], Integer incy)
```

3 Arguments

- 1: **uplo** – MatrixTriangle *Input*
On entry: specifies whether the upper or lower triangular part of A is stored as follows:
 if **uplo** = **UpperTriangle**, the upper triangular part of A is stored;
 if **uplo** = **LowerTriangle**, the lower triangular part of A is stored.
Constraint: **uplo** = **UpperTriangle** or **LowerTriangle**.
- 2: **n** – Integer *Input*
On entry: n , the order of the matrix A .
Constraint: $n \geq 0$.
- 3: **k** – Integer *Input*
On entry: k , the number of sub-diagonals or super-diagonals of the matrix A .
Constraint: $k \geq 0$.
- 4: **alpha** – double *Input*
On entry: the scalar α .
- 5: **a**[$n \times tda$] – const double *Input*
On entry: the n by n symmetric band matrix A , stored in n rows and $k + 1$ columns. More precisely,
 if **uplo** = **UpperTriangle**, the elements of the upper triangle of A within the band must be stored with element a_{ij} in **a**[$i - 1$][$j - i$] for $1 \leq i \leq n$ and $i \leq j \leq \min(n, i + k)$;
 if **uplo** = **LowerTriangle**, the elements of the lower triangle of A within the band must be stored with element a_{ij} in **a**[$i - 1$][$k + j - i$] for $1 \leq i \leq n$ and $\max(1, i - k) \leq j \leq i$.

- 6: **tda** – Integer *Input*
On entry: the second dimension of the array **a** as declared in the function from which dsbmv (f06pdc) is called.
Constraint: **tda** \geq **k** + 1.
- 7: **x[n]** – const double *Input*
On entry: the vector *x* of length *n*.
- 8: **incx** – Integer *Input*
On entry: the increment in the subscripts of **x** between successive elements of *x*.
Constraint: **incx** \neq 0.
- 9: **beta** – double *Input*
On entry: the scalar β .
- 10: **y[n]** – double *Input/Output*
On entry: the vector *y* of length *n*.
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: **incy** \neq 0.

4 Error Indicators and Warnings

If a function is called with an invalid argument then an error message is output on stderr, giving the name of the function and the number of the first invalid argument, and execution is terminated.
