NAG C Library Function Document

zgbmv (f06sbc)

1 Purpose

zgbmv (f06sbc) performs one of the matrix-vector operations

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

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

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

2 Specification

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

```
void zgbmv (MatrixTranspose trans, Integer m, Integer n, Integer kl, Integer ku,
      Complex alpha, const Complex a[], Integer tda, const Complex x[], Integer incx,
      Complex beta, Complex y[], Integer incy)
```

3 Arguments

1: **trans** – MatrixTranspose *Input*

On entry: specifies the operation to be performed as follows:

if **trans** = **NoTranspose**, $y \leftarrow \alpha Ax + \beta y$;
if **trans** = **Transpose**, $y \leftarrow \alpha A^{\mathrm{T}}x + \beta y$;
if **trans** = **ConjugateTranspose**, $y \leftarrow \alpha A^{H}x + \beta y$.

Constraint: **trans** = **NoTranspose**, **Transpose** or **ConjugateTranspose**.

2: **m** – Integer *Input*

On entry: m, the number of rows of the matrix A.

Constraint: **m** ≥ 0.

3: **n** – Integer *Input*

On entry: n, the number of columns of the matrix A.

Constraint: **n** ≥ 0.

4: **kl** – Integer *Input*

On entry: k_l, the number of sub-diagonals within the band of A.

Constraint: **kl** ≥ 0.

5: **ku** – Integer *Input*

On entry: k_u, the number of super-diagonals within the band of A.

Constraint: **ku** ≥ 0.

6: **alpha** – Complex *Input*

On entry: the scalar α.

7: **a**[**m** × **tda**] – const Complex *Input*

On entry: the m by n band matrix A, stored in m rows and $k_l + k_u + 1$ columns. More precisely, a_{ij} must be stored in $\mathbf{a}[i-1][k_l - i + j]$ for $1 \leq i \leq m$ and $\max(1, i - k_l) \leq j \leq \min(n, i + k_u)$.

8: **tda** – Integer *Input*

On entry: the second dimension of the array **a** as declared in the function from which zgbmv (f06sbc) is called.

Constraint: **tda** $\geq$ **kl** + **ku** + 1.

9: **x**[**n**] – const Complex *Input*

On entry: the incremented array **x** must the contain 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** – Complex *Input*

On entry: the scalar β.

12: **y**[**m**] – Complex *Input/Output*

On entry: the incremented array **y** must contain the vector y.

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** $\neq 0$.

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.