NAG C Library Function Document

zgemv (f06sac)

1 Purpose

zgemv (f06sac) 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 matrix, 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 zgemv (MatrixTranspose trans, Integer m, Integer n, 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: $\mathbf{m} \geq 0$.

3: **n** – Integer *Input*

On entry: the dimension of the array **x** as declared in the function from which zgemv (f06sac) is called. n, the number of columns of the matrix A.

Constraint: $\mathbf{n} \geq 0$.

4: **alpha** – Complex *Input*

On entry: the scalar α.

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

On entry: the m by n matrix A.

6: **tda** – Integer *Input*

On entry: the second dimension of the array **a** as declared in the function from which zgemv (f06sac) is called.

Constraint: $\mathbf{tda} \geq \max(1, \mathbf{n})$.

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

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

8: **incx** – Integer *Input*

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

Constraint: **incx** $\neq 0$.

9: **beta** – Complex *Input*

On entry: the scalar β.

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

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

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.