# NAG C Library Function Document

# dgemv (f06pac)

## 1 Purpose

dgemv (f06pac) performs one of the matrix-vector operations

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

where $A$ is an $m$ by $n$ real matrix, $x$ and $y$ are real vectors, and $\alpha$ and $\beta$ are real scalars.

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

## 2 Specification

```
#include <nag.h>
#include <nagf06.h>
void dgemv (MatrixTranspose trans, Integer m, Integer n, double alpha,
      const double a[], Integer tda, const double x[], Integer incx, double beta,
      double 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** or **ConjugateTranspose**, $y \leftarrow \alpha A^{\mathrm{T}}x + \beta y$.

*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*: $n$, the number of columns of the matrix $A$.

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

4: **alpha** – double *Input*

*On entry*: the scalar $\alpha$.

5: **a**[**m** × **tda**] – const double *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 dgemv (f06pac) is called.

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

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

*On entry*: the vector $x$, of length $n$ if **trans** = **NoTranspose**, or of length $m$ if **trans** = **Transpose** or **ConjugateTranspose**.

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 $\beta$.

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

*On entry*: the vector $y$, of length $m$ if **trans** = **NoTranspose**, or of length $n$ if **trans** = **Transpose** or **ConjugateTranspose**.

*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.