

# NAG Library Routine Document

## F06TCF

**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

F06TCF performs the matrix-vector operation

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

where  $A$  is an  $n$  by  $n$  complex symmetric matrix stored in packed form,  $x$  and  $y$  are  $n$  element complex vectors, and  $\alpha$  and  $\beta$  are complex scalars.

### 2 Specification

```
SUBROUTINE F06TCF(UPLO, N, ALPHA, AP, X, INCX, BETA, Y, INCY)
INTEGER          N, INCX, INCY
complex*16      ALPHA, AP(*), X(*), BETA, Y(*)
CHARACTER*1      UPLO
```

### 3 Description

None.

### 4 References

None.

### 5 Parameters

- |    |                                                                                         |              |
|----|-----------------------------------------------------------------------------------------|--------------|
| 1: | UPLO – CHARACTER*1                                                                      | <i>Input</i> |
|    | <i>On entry:</i> specifies whether the upper or lower triangular part of $A$ is stored. |              |
|    | UPLO = 'U'<br>The upper triangular part of $A$ is stored.                               |              |
|    | UPLO = 'L'<br>The lower triangular part of $A$ is stored.                               |              |
|    | <i>Constraint:</i> UPLO = 'U' or 'L'.                                                   |              |
| 2: | N – INTEGER                                                                             | <i>Input</i> |
|    | <i>On entry:</i> $n$ , the order of the matrix $A$ .                                    |              |
|    | <i>Constraint:</i> $N \geq 0$ .                                                         |              |
| 3: | ALPHA – <b>complex*16</b>                                                               | <i>Input</i> |
|    | <i>On entry:</i> the scalar $\alpha$ .                                                  |              |
| 4: | AP(*) – <b>complex*16</b> array                                                         | <i>Input</i> |
|    | <b>Note:</b> the dimension of the array AP must be at least $N \times (N + 1)/2$ .      |              |
|    | <i>On entry:</i> the $n$ by $n$ symmetric matrix $A$ , packed by columns.               |              |

More precisely,

if  $UPLO = 'U'$ , the upper triangle of  $A$  must be stored with element  $A_{ij}$  in  $AP(i + j(j - 1)/2)$  for  $i \leq j$ ;

if  $UPLO = 'L'$ , the lower triangle of  $A$  must be stored with element  $A_{ij}$  in  $AP(i + (2n - j)(j - 1)/2)$  for  $i \geq j$ .

5:  $X(*)$  – **complex\*16** array *Input*

**Note:** the dimension of the array  $X$  must be at least  $1 + (N - 1)|INCX|$ .

*On entry:* the incremented array  $X$  must contain the  $n$  element vector  $x$ .

6:  $INCX$  – INTEGER *Input*

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

*Constraint:*  $INCX \neq 0$ .

7:  $BETA$  – **complex\*16** *Input*

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

8:  $Y(*)$  – **complex\*16** array *Input/Output*

**Note:** the dimension of the array  $Y$  must be at least  $1 + (N - 1)|INCY|$ .

*On entry:* the incremented array  $Y$  must contain the  $n$  element vector  $y$ .

*On exit:* the updated vector  $y$ .

9:  $INCY$  – INTEGER *Input*

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

*Constraint:*  $INCY \neq 0$ .

## 6 Error Indicators and Warnings

None.

## 7 Accuracy

Not applicable.

## 8 Further Comments

None.

## 9 Example

None.

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