

# NAG Library Routine Document

## F06HMF (ZROT)

**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

F06HMF (ZROT) applies a plane rotation with a real cosine and complex sine to two complex vectors.

### 2 Specification

```
SUBROUTINE F06HMF (N, CX, INCX, CY, INCY, C, S)
  INTEGER          N, INCX, INCY
  REAL (KIND=nag_wp) C
  COMPLEX (KIND=nag_wp) CX(*), CY(*), S
```

The routine may be called by its LAPACK name *zrot*.

### 3 Description

F06HMF (ZROT) applies a plane rotation, where the cosine is real and the sine is complex, to two  $n$ -element complex vectors  $x$  and  $y$ :

$$\begin{pmatrix} x^T \\ y^T \end{pmatrix} \leftarrow \begin{pmatrix} c & s \\ -\bar{s} & c \end{pmatrix} \begin{pmatrix} x^T \\ y^T \end{pmatrix}.$$

### 4 References

None.

### 5 Arguments

- 1: N – INTEGER *Input*  
*On entry:*  $n$ , the number of elements in  $x$  and  $y$ .
- 2: CX(\*) – COMPLEX (KIND=nag\_wp) array *Input/Output*  
**Note:** the dimension of the array CX must be at least  $\max(1, 1 + (N - 1) \times |\text{INCX}|)$ .  
*On entry:* the  $n$ -element vector  $x$ .  
 If  $\text{INCX} > 0$ ,  $x_i$  must be stored in  $\text{CX}(1 + (i - 1) \times \text{INCX})$ , for  $i = 1, 2, \dots, N$ .  
 If  $\text{INCX} < 0$ ,  $x_i$  must be stored in  $\text{CX}(1 - (N - i) \times \text{INCX})$ , for  $i = 1, 2, \dots, N$ .  
 Intermediate elements of CX are not referenced.  
*On exit:* the transformed vector  $x$  stored in the array elements used to supply the original vector  $x$ .  
 Intermediate elements of CX are unchanged.
- 3: INCX – INTEGER *Input*  
*On entry:* the increment in the subscripts of CX between successive elements of  $x$ .

- 4: CY(\*) – COMPLEX (KIND=nag\_wp) array *Input/Output*  
**Note:** the dimension of the array CY must be at least  $\max(1, 1 + (N - 1) \times |\text{INCY}|)$ .  
*On entry:* the  $n$ -element vector  $y$ .  
 If  $\text{INCY} > 0$ ,  $y_i$  must be stored in  $\text{CY}(1 + (i - 1) \times \text{INCY})$ , for  $i = 1, 2, \dots, N$ .  
 If  $\text{INCY} < 0$ ,  $y_i$  must be stored in  $\text{CY}(1 - (N - i) \times \text{INCY})$ , for  $i = 1, 2, \dots, N$ .  
 Intermediate elements of CY are not referenced.  
*On exit:* the transformed vector  $y$ .  
 Intermediate elements of CY are unchanged.
- 5: INCY – INTEGER *Input*  
*On entry:* the increment in the subscripts of CY between successive elements of  $y$ .
- 6: C – REAL (KIND=nag\_wp) *Input*  
*On entry:* the value  $c$ , the cosine of the rotation.
- 7: S – COMPLEX (KIND=nag\_wp) *Input*  
*On entry:* the value  $s$ , the sine of the rotation.

## 6 Error Indicators and Warnings

None.

## 7 Accuracy

Not applicable.

## 8 Parallelism and Performance

F06HMF (ZROT) is not threaded in any implementation.

## 9 Further Comments

None.

## 10 Example

None.

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