

# NAG Fortran Library Routine Document

## F06CAF

**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

F06CAF generates a complex Givens plane rotation with parameters  $c$  (real  $\geq 0$ ) and  $s$  (complex), such that, given complex  $a$  and  $b$ :

$$\begin{pmatrix} c & \bar{s} \\ -s & c \end{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix} = \begin{pmatrix} d \\ 0 \end{pmatrix}.$$

If  $a$  is real, then  $d$  is also real. On exit,  $b$  is overwritten by  $t$ , the tangent of the rotation;  $c$  and  $s$  can be reconstructed from the single stored value  $t$ , by a subsequent call to F06CCF.

If  $|b| < \epsilon|a|$ , where  $\epsilon$  is the ***machine precision***, the routine sets  $c = 1$  and  $s = t$ .

Note that  $t$  is always set to  $b/a$ , unless overflow would occur, in which case the routine returns the value of the expression

```
F06CLF(B,A,FAIL)
```

### 2 Specification

```
SUBROUTINE F06CAF (A, B, C, S)
  double precision      C
  complex*16           A, B, S
```

### 3 Description

None.

### 4 References

None.

### 5 Parameters

- |    |                                                                                               |                     |
|----|-----------------------------------------------------------------------------------------------|---------------------|
| 1: | $A$ – <b><i>complex*16</i></b>                                                                | <i>Input/Output</i> |
|    | <i>On entry:</i> the value $a$ , the 1st element of the vector which determines the rotation. |                     |
|    | <i>On exit:</i> the value $d$ .                                                               |                     |
| 2: | $B$ – <b><i>complex*16</i></b>                                                                | <i>Input/Output</i> |
|    | <i>On entry:</i> the value $b$ , the 2nd element of the vector which determines the rotation. |                     |
|    | <i>On exit:</i> the value $t$ , the tangent of the rotation.                                  |                     |
| 3: | $C$ – <b><i>double precision</i></b>                                                          | <i>Output</i>       |
|    | <i>On exit:</i> the value $c$ , the cosine of the rotation.                                   |                     |
| 4: | $S$ – <b><i>complex*16</i></b>                                                                | <i>Output</i>       |
|    | <i>On exit:</i> the value $s$ , the sine of the rotation.                                     |                     |

## 6 Error Indicators and Warnings

None.

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