

NAG 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 having real cosine.

2 Specification

```
SUBROUTINE F06CAF (A, B, C, S)
REAL (KIND=nag_wp) C
COMPLEX (KIND=nag_wp) A, B, S
```

3 Description

F06CAF generates a complex Givens plane rotation with parameters c (real ≥ 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 ϵ 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

$$\text{CMPLX}(flmax \times \text{sign}(\text{Re}(b)/a), flmax \times \text{sign}(\text{Im}(b)/a));$$

$flmax$ is the real value given by 1/(X02AMF).

4 References

None.

5 Arguments

- | | | |
|----|--|---------------------|
| 1: | A – COMPLEX (KIND=nag_wp) | <i>Input/Output</i> |
| | <i>On entry:</i> the value a , the first element of the vector which determines the rotation. | |
| | <i>On exit:</i> the value d . | |
| 2: | B – COMPLEX (KIND=nag_wp) | <i>Input/Output</i> |
| | <i>On entry:</i> the value b , the second element of the vector which determines the rotation. | |
| | <i>On exit:</i> the value t , the tangent of the rotation. | |
| 3: | C – REAL (KIND=nag_wp) | <i>Output</i> |
| | <i>On exit:</i> the value c , the cosine of the rotation. | |

4: S – COMPLEX (KIND=nag_wp)

Output

On exit: the value s , the sine of the rotation.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

F06CAF is not threaded in any implementation.

9 Further Comments

None.

10 Example

None.
