

NAG Library Routine Document

F06CBF

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

F06CBF generates a complex Givens plane rotation having real sine.

2 Specification

```
SUBROUTINE F06CBF (A, B, C, S)
```

```
REAL (KIND=nag_wp) S
```

```
COMPLEX (KIND=nag_wp) A, B, C
```

3 Description

F06CBF generates a complex Givens plane rotation with parameters c (complex) and s (real), such that, given complex a and b :

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

If b 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 F06CDF.

If $|b| < \epsilon|a|$ and $\text{Im}(a) = 0$, where ϵ is the *machine precision*, the routine sets $c = 1$ and $s = |t|$.

If $|b| < \epsilon|a|$ and $\text{Im}(a) \neq 0$, the routine sets

$$c = \frac{\text{sign}(\text{Re}(a))a}{|a|} \quad \text{and} \quad s = |t|$$

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 Parameters

- 1: A – COMPLEX (KIND=nag_wp) *Input/Output*
On entry: the value a , the first element of the vector which determines the rotation.
On exit: the value d .
- 2: B – COMPLEX (KIND=nag_wp) *Input/Output*
On entry: the value b , the second element of the vector which determines the rotation.
On exit: the value t , the tangent of the rotation.

- 3: C – COMPLEX (KIND=nag_wp) *Output*
On exit: the value c , the cosine of the rotation.
- 4: S – REAL (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 Further Comments

None.

9 Example

None.
