

# NAG Library Routine Document

## F06BAF

**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

F06BAF generates a real Givens plane rotation and the tangent of that rotation.

### 2 Specification

```
SUBROUTINE F06BAF (A, B, C, S)
REAL (KIND=nag_wp) A, B, C, S
```

### 3 Description

F06BAF generates a real Givens plane rotation with parameters  $c$  ( $\geq 0$ ) and  $s$ , such that, given real  $a$  and  $b$ :

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

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 F06BCF.

If  $|b| < \sqrt{\epsilon}|a|$ , where  $\epsilon$  is the *machine precision*, the routine sets  $c = 1$  and  $s = 0$ ; if  $|a| < \sqrt{\epsilon}|b|$ , the routine sets  $c = 0$  and  $s = \text{sign } b/a$ .

Note that  $t$  is always set to  $b/a$ , unless this would overflow, in which case the value  $flmax \times \text{sign } b/a$  is returned, where  $flmax$  is the value given by 1/(X02AMF).

To apply the plane rotation to a pair of real vectors, call F06EPF (DROT); to apply it to a pair of complex vectors, call F06KPF (ZDROT).

### 4 References

None.

### 5 Arguments

- |    |  |                     |
|----|--|---------------------|
| 1: | A – REAL (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 – REAL (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 – REAL (KIND=nag_wp)   | <i>Output</i>       |
|    | <i>On exit:</i> the value $s$ , the sine of the rotation.  |                     |

## **6 Error Indicators and Warnings**

None.

## **7 Accuracy**

Not applicable.

## **8 Parallelism and Performance**

F06BAF is not threaded in any implementation.

## **9 Further Comments**

None.

## **10 Example**

None.

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