

# NAG Library Routine Document

## F06BPF

**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

F06BPF returns an eigenvalue of a 2 by 2 real symmetric matrix.

### 2 Specification

```
FUNCTION F06BPF (A, B, C)
REAL (KIND=nag_wp) F06BPF
REAL (KIND=nag_wp) A, B, C
```

### 3 Description

F06BPF returns an eigenvalue of the 2 by 2 real symmetric matrix

$$\begin{pmatrix} a & b \\ b & c \end{pmatrix},$$

via the function name. The result is intended for use as a shift in symmetric eigenvalue routines.

The eigenvalue is computed as

$$c - \frac{b}{f + \text{sign } f \times \sqrt{1 + f^2}},$$

where  $f = \frac{a-c}{2b}$ .

This is the eigenvalue nearer to  $c$  if  $a \neq c$ , and is equal to  $c - b$  if  $a = c$ .

### 4 References

None.

### 5 Arguments

- |    |  |              |
|----|--|--------------|
| 1: | A – REAL (KIND=nag_wp)   | <i>Input</i> |
|    | <i>On entry:</i> the value $a$ , the (1,1) element of the input matrix.          |              |
| 2: | B – REAL (KIND=nag_wp)   | <i>Input</i> |
|    | <i>On entry:</i> the value $b$ , the (1,2) or (2,1) element of the input matrix. |              |
| 3: | C – REAL (KIND=nag_wp)   | <i>Input</i> |
|    | <i>On entry:</i> the value $c$ , the (2,2) element of the input matrix.          |              |

### 6 Error Indicators and Warnings

None.

**7 Accuracy**

Not applicable.

**8 Parallelism and Performance**

F06BPF is not threaded in any implementation.

**9 Further Comments**

None.

**10 Example**

None.

---