

NAG Library Routine Document

F06CHF

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

F06CHF applies a complex similarity rotation having real cosine and complex sine to a 2 by 2 complex symmetric matrix.

2 Specification

```
SUBROUTINE F06CHF(X, Y, Z, C, S)
  double precision      C
  complex*16           X, Y, Z, S
```

3 Description

F06CHF applies a complex similarity rotation, with parameters c (real) and s (complex), to a given 2 by 2 complex Hermitian matrix; that is, it performs the operation:

$$\begin{pmatrix} x & y \\ \bar{y} & z \end{pmatrix} \leftarrow \begin{pmatrix} c & \bar{s} \\ -s & c \end{pmatrix} \begin{pmatrix} x & y \\ \bar{y} & z \end{pmatrix} \begin{pmatrix} c & -\bar{s} \\ s & c \end{pmatrix},$$

where x and z are real.

The parameter X and Z which hold x and z are declared ***complex*16*** for convenience when using the routine to operate on submatrices of larger Hermitian matrices.

Note that:

$$\begin{pmatrix} z & \bar{y} \\ y & x \end{pmatrix} \leftarrow \begin{pmatrix} c & \bar{w} \\ -w & c \end{pmatrix} \begin{pmatrix} z & \bar{y} \\ y & x \end{pmatrix} \begin{pmatrix} c & -\bar{w} \\ w & c \end{pmatrix},$$

where $w = -\bar{s}$, so to use F06CHF when y is the (2,1) element of the matrix, you can make the call

```
CALL F06CHF(Z, Y, X, C, -CONJG(S))
```

4 References

None.

5 Parameters

- 1: X – ***complex*16*** *Input/Output*
On entry: the value x , the (1,1) element of the input matrix. The imaginary part of X need not be set; it is assumed to be zero.
On exit: the transformed value x . The imaginary part of X is set to zero.
- 2: Y – ***complex*16*** *Input/Output*
On entry: the value y , the (1,2) element of the input matrix.
On exit: the transformed value y .

- 3: Z – *complex*16* *Input/Output*
 On entry: the value z , the (2,2) element of the input matrix. The imaginary part of Z need not be set; it is assumed to be zero.
 On exit: the transformed value z . The imaginary part of Z is set to zero.
- 4: C – *double precision* *Input*
 On entry: the value c , the cosine of the rotation.
- 5: S – *complex*16* *Input*
 On entry: 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.
