

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 Hermitian matrix.

2 Specification

```
SUBROUTINE F06CHF (X, Y, Z, C, S)
  REAL (KIND=nag_wp)      C
  COMPLEX (KIND=nag_wp) 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 argument X and Z which hold x and z are declared complex 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 Arguments

- | | | |
|----|--|---------------------|
| 1: | X – COMPLEX (KIND=nag_wp)
<i>On entry:</i> the value x , the (1, 1) element of the input matrix.
<i>On exit:</i> the transformed value x . | <i>Input/Output</i> |
| 2: | Y – COMPLEX (KIND=nag_wp)
<i>On entry:</i> the value y , the (1, 2) element of the input matrix.
<i>On exit:</i> the transformed value y . | <i>Input/Output</i> |
| 3: | Z – COMPLEX (KIND=nag_wp)
<i>On entry:</i> the value z , the (2, 2) element of the input matrix. | <i>Input/Output</i> |

On exit: the transformed value z .

4: C – REAL (KIND=nag_wp)

Input

On entry: the value c , the cosine of the rotation.

5: S – COMPLEX (KIND=nag_wp)

Input

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

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

F06CHF is not threaded in any implementation.

9 Further Comments

None.

10 Example

None.
