# NAG Fortran 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, 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 parameters 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))
```

## 2 Specification

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

## 3 Description

None.

## 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.