NAG C Library Function Document

zher2k (f06zrc)

1 Purpose

zher2k (f06zrc) performs one of the Hermitian rank-$2k$ update operations

$$C \leftarrow \alpha AB^H + \bar{\alpha}BA^H + \beta C \text{ or } C \leftarrow \alpha A^H B + \bar{\alpha}B^H A + \beta C,$$

where A and B are complex matrices, C is an n by n complex Hermitian matrix, α is a complex scalar, and β is a real scalar.

2 Specification

```
#include <nag.h>
#include <nagf06.h>
```

```
void zher2k (MatrixTriangle uplo, MatrixTranspose trans, Integer n, Integer k,
      Complex alpha, const Complex a[], Integer tda, const Complex b[], Integer tdb,
      double beta, Complex c[], Integer tdc)
```

3 Arguments

1: **uplo** – MatrixTriangle *Input*

On entry: specifies whether the upper or lower triangular part of C is stored as follows:

if **uplo** = **UpperTriangle**, the upper triangular part of C is stored;
if **uplo** = **LowerTriangle**, the lower triangular part of C is stored.

Constraint: **uplo** = **UpperTriangle** or **LowerTriangle**.

2: **trans** – MatrixTranspose *Input*

On entry: specifies the operation to be performed as follows:

if **trans** = **NoTranspose**, $C \leftarrow \alpha AB^H + \bar{\alpha}BA^H + \beta C$;
if **trans** = **ConjugateTranspose**, $C \leftarrow \alpha A^H B + \bar{\alpha}B^H A + \beta C$.

Constraint: **trans** = **NoTranspose** or **ConjugateTranspose**.

3: **n** – Integer *Input*

On entry: n, the order of the matrix C; the number of rows of A and B if **trans** = **NoTranspose**, or the number of columns of A and B otherwise.

Constraint: **n** ≥ 0.

4: **k** – Integer *Input*

On entry: k, the number of columns of A and B if **trans** = **NoTranspose**, or the number of rows of A and B otherwise.

Constraint: **k** ≥ 0.

5: **alpha** – Complex *Input*

On entry: the scalar α.

6: **a**[× **tda**] – const Complex *Input*

On entry: the matrix A; A is n by k if **trans** = **NoTranspose**, or k by n otherwise.

7: **tda** – Integer *Input*

On entry: the second dimension of the array **a** as declared in the function from which zher2k (f06zrc) is called.

Constraint: **tda** $\geq$ *max*(1,**k**) if **trans** = **NoTranspose**; **tda** $\geq$ *max*(1,**n**) otherwise.

8: **b**[× **tdb**] – const Complex *Input*

On entry: the matrix B; B is n by k if **trans** = **NoTranspose**, or k by n otherwise.

9: **tdb** – Integer *Input*

On entry: the second dimension of the array **b** as declared in the function from which zher2k (f06zrc) is called.

Constraint: **tdb** $\geq$ *max*(1,**k**) if **trans** = **NoTranspose**; **tdb** $\geq$ *max*(1,**n**) otherwise.

10: **beta** – double *Input*

On entry: the scalar β.

11: **c**[**n** × **tdc**] – Complex *Input/Output*

On entry: the n by n Hermitian matrix C.

uplo = **UpperTriangle**

The upper triangle of C must be stored and the elements of the array below the diagonal are not referenced.

uplo = **LowerTriangle**

The lower triangle of C must be stored and the elements of the array above the diagonal are not referenced.

On exit: the updated matrix C. The imaginary parts of the diagonal elements are set to zero.

12: **tdc** – Integer *Input*

On entry: the second dimension of the array **c** as declared in the function from which zher2k (f06zrc) is called.

Constraint: **tdc** $\geq \max(1, \mathbf{n})$.

4 Error Indicators and Warnings

If a function is called with an invalid argument then an error message is output on stderr, giving the name of the function and the number of the first invalid argument, and execution is terminated.