

NAG C Library Function Document

zherk (f06zpc)

1 Purpose

zherk (f06zpc) performs one of the Hermitian rank- k update operations

$$C \leftarrow \alpha AA^H + \beta C \text{ or } C \leftarrow \alpha A^H A + \beta C$$

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

2 Specification

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

```
void zherk (MatrixTriangle uplo, MatrixTranspose trans, Integer n, Integer k,
           double alpha, const Complex a[], Integer tda, 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**, $C \leftarrow \alpha AA^H + \beta C$;
 if **trans** = **ConjugateTranspose**, $C \leftarrow \alpha A^H A + \beta C$.
Constraint: **trans** = **NoTranspose** or **ConjugateTranspose**.
- 3: **n** – Integer *Input*
On entry: n , the order of the matrix C ; the number of rows of A if **trans** = **NoTranspose**, or the number of columns of A otherwise.
Constraint: **n** \geq 0.
- 4: **k** – Integer *Input*
On entry: k , the number of columns of A if **trans** = **NoTranspose**, or the number of rows of A otherwise.
Constraint: **k** \geq 0.
- 5: **alpha** – double *Input*
On entry: the scalar α .
- 6: **a**[\times **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 zherk (f06zpc) is called.
Constraint: **tda** $\geq \max(1, \mathbf{k})$ if **trans** = **NoTranspose**; **tda** $\geq \max(1, \mathbf{n})$ otherwise.
- 8: **beta** – double *Input*
On entry: the scalar β .
- 9: **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.
- 10: **tdc** – Integer *Input*
On entry: the second dimension of the array **c** as declared in the function from which zherk (f06zpc) 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.
