

NAG Library Routine Document

F06SMF (ZGERU)

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

F06SMF (ZGERU) computes the rank-1 update of a complex general matrix using an unconjugated vector.

2 Specification

```
SUBROUTINE F06SMF (M, N, ALPHA, X, INCX, Y, INCY, A, LDA)
  INTEGER          M, N, INCX, INCY, LDA
  COMPLEX (KIND=nag_wp) ALPHA, X(*), Y(*), A(LDA,*)
```

The routine may be called by its BLAS name *zgeru*.

3 Description

F06SMF (ZGERU) performs the rank-1 update operation

$$A \leftarrow \alpha xy^T + A,$$

where A is an m by n complex matrix, x is an m element complex vector, y is an n -element complex vector, and α is a complex scalar.

4 References

None.

5 Parameters

- | | | |
|----|---------------------------------------------------------------------------------------------------------------|--------------|
| 1: | M – INTEGER | <i>Input</i> |
| | <i>On entry:</i> m , the number of rows of the matrix A . | |
| | <i>Constraint:</i> $M \geq 0$. | |
| 2: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of columns of the matrix A . | |
| | <i>Constraint:</i> $N \geq 0$. | |
| 3: | ALPHA – COMPLEX (KIND=nag_wp) | <i>Input</i> |
| | <i>On entry:</i> the scalar α . | |
| 4: | X(*) – COMPLEX (KIND=nag_wp) array | <i>Input</i> |
| | Note: the dimension of the array X must be at least $\max(1, 1 + (M - 1) \times \text{INCX})$. | |
| | <i>On entry:</i> the m element vector x . | |
| | If $\text{INCX} > 0$, x_i must be stored in $X(1 + (i-1) \times \text{INCX})$, for $i = 1, 2, \dots, M$. | |
| | If $\text{INCX} < 0$, x_i must be stored in $X(1 - (M-i) \times \text{INCX})$, for $i = 1, 2, \dots, M$. | |
| | Intermediate elements of X are not referenced. | |

- 5: INCX – INTEGER *Input*
On entry: the increment in the subscripts of X between successive elements of x .
Constraint: $\text{INCX} \neq 0$.
- 6: Y(*) – COMPLEX (KIND=nag_wp) array *Input*
Note: the dimension of the array Y must be at least $\max(1, 1 + (N - 1) \times |\text{INCY}|)$.
On entry: the n -element vector y .
 If $\text{INCY} > 0$, y_i must be stored in $Y(1 + (i - 1) \times \text{INCY})$, for $i = 1, 2, \dots, N$.
 If $\text{INCY} < 0$, y_i must be stored in $Y(1 - (N - i) \times \text{INCY})$, for $i = 1, 2, \dots, N$.
 Intermediate elements of Y are not referenced.
- 7: INCY – INTEGER *Input*
On entry: the increment in the subscripts of Y between successive elements of y .
Constraint: $\text{INCY} \neq 0$.
- 8: A(LDA, *) – COMPLEX (KIND=nag_wp) array *Input/Output*
Note: the second dimension of the array A must be at least N.
On entry: the m by n matrix A .
On exit: the updated matrix A .
- 9: LDA – INTEGER *Input*
On entry: the first dimension of the array A as declared in the (sub)program from which F06SMF (ZGERU) is called.
Constraint: $\text{LDA} \geq \max(1, M)$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

None.
