

NAG Library Routine Document

F06PRF (DSYR2)

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

F06PRF (DSYR2) computes the rank-2 update of a real symmetric matrix.

2 Specification

```
SUBROUTINE F06PRF (UPLO, N, ALPHA, X, INCX, Y, INCY, A, LDA)
  INTEGER          N, INCX, INCY, LDA
  REAL (KIND=nag_wp) ALPHA, X(*), Y(*), A(LDA,*)
  CHARACTER(1)     UPLO
```

The routine may be called by its BLAS name *dsyr2*.

3 Description

F06PRF (DSYR2) performs the symmetric rank-2 update operation

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

where A is an n by n real symmetric matrix, x and y are n -element real vectors, and α is a real scalar.

4 References

None.

5 Arguments

- | | | |
|----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| 1: | UPLO – CHARACTER(1)
<i>On entry:</i> specifies whether the upper or lower triangular part of A is stored.
UPLO = 'U'
The upper triangular part of A is stored.
UPLO = 'L'
The lower triangular part of A is stored.
<i>Constraint:</i> UPLO = 'U' or 'L'. | <i>Input</i> |
| 2: | N – INTEGER
<i>On entry:</i> n , the order of the matrix A .
<i>Constraint:</i> $N \geq 0$. | <i>Input</i> |
| 3: | ALPHA – REAL (KIND=nag_wp)
<i>On entry:</i> the scalar α . | <i>Input</i> |
| 4: | X(*) – REAL (KIND=nag_wp) array
Note: the dimension of the array X must be at least $\max(1, 1 + (N - 1) \times \text{INCX})$.
<i>On entry:</i> the n -element vector x . | <i>Input</i> |

If $\text{INCX} > 0$, x_i must be stored in $X(1 + (i - 1) \times \text{INCX})$, for $i = 1, 2, \dots, N$.

If $\text{INCX} < 0$, x_i must be stored in $X(1 - (N - i) \times \text{INCX})$, for $i = 1, 2, \dots, N$.

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: $Y(*)$ – REAL (KIND=nag_wp) array *Input*

Note: the dimension of the array Y must be at least $\max(1, 1 + (N - 1) \times |\text{INCX}|)$.

On entry: the n -element vector y .

If $\text{INCX} > 0$, y_i must be stored in $Y(1 + (i - 1) \times \text{INCX})$, for $i = 1, 2, \dots, N$.

If $\text{INCX} < 0$, y_i must be stored in $Y(1 - (N - i) \times \text{INCX})$, for $i = 1, 2, \dots, N$.

Intermediate elements of Y are not referenced.

- 7: INCX – INTEGER *Input*

On entry: the increment in the subscripts of Y between successive elements of y .

Constraint: $\text{INCX} \neq 0$.

- 8: $A(\text{LDA}, *)$ – REAL (KIND=nag_wp) array *Input/Output*

Note: the second dimension of the array A must be at least $\max(1, N)$.

On entry: the n by n symmetric matrix A .

If $\text{UPLO} = 'U'$, the upper triangular part of A must be stored and the elements of the array below the diagonal are not referenced.

If $\text{UPLO} = 'L'$, the lower triangular part of A must be stored and the elements of the array above the diagonal are not referenced.

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 F06PRF (DSYR2) is called.

Constraint: $\text{LDA} \geq \max(1, N)$.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

F06PRF (DSYR2) is not threaded in any implementation.

9 Further Comments

None.

10 Example

None.
