NAG Library Routine Document

F06PPF (DSYR)

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

F06PPF (DSYR) computes the rank-1 update of a real symmetric matrix.

2   Specification

```
SUBROUTINE F06PPF (UPLO, N, ALPHA, X, INCX, A, LDA)

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

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

3   Description

F06PPF (DSYR) performs the symmetric rank-1 update operation

$$A \leftarrow \alpha x x^{\mathrm{T}} + A,$$

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

4   References

None.

5   Parameters

1:      UPLO – CHARACTER(1)   *Input*

   On entry: 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.

   Constraint: UPLO = 'U' or 'L'.

2:      N – INTEGER   *Input*

   On entry: n, the order of the matrix A.

   Constraint: N $\geq$ 0.

3:      ALPHA – REAL (KIND=nag_wp)   *Input*

   On entry: the scalar α.

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

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

   On entry: the n-element vector x.

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

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

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: $INCX \neq 0$.

6: A(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 UPLO = 'U', the upper triangular part of A must be stored and the elements of the array below the diagonal are not referenced.

  If 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.

7: LDA – INTEGER   *Input*

On entry: the first dimension of the array A as declared in the (sub)program from which F06PPF (DSYR) is called.

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

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

None.