NAG C Library Function Document

dspr (f06pqc)

1 Purpose

dspr (f06pqc) 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, stored in packed form, x is an n element real vector, and α is a real scalar.

2 Specification

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

void dspr (MatrixTriangle uplo, Integer n, double alpha, const double x[],
     Integer incx, double ap[])
```

3 Arguments

1: **uplo** – MatrixTriangle *Input*

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

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

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

2: **n** – Integer *Input*

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

Constraint: $\mathbf{n} \geq 0$.

3: **alpha** – double *Input*

On entry: the scalar α.

4: **x**[**n**] – const double *Input*

On entry: the vector x of length n.

5: **incx** – Integer *Input*

On entry: the increment in the subscripts of **x** between successive elements of x.

Constraint: **incx** $\neq 0$.

6: **ap**[dim] – double *Input/Output*

Note: the dimension, *dim*, of the array **ap** must be at least $\mathbf{n}(\mathbf{n}+1)/2$.

On entry: the n by n symmetric matrix A, packed by rows. More precisely,

if **uplo** = **UpperTriangle**, the upper triangle of A must be stored with element a_{ij} in **ap**$[j-1+(2n-i)(i-1)/2]$ for $i \leq j$;
if **uplo** = **LowerTriangle**, the lower triangle of A must be stored with element a_{ij} in **ap**$[j-1+i(i-1)/2]$ for $j \leq i$.

On exit: the updated matrix A.

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.