

NAG Library Routine Document

F06FAF

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

F06FAF computes the cosine of the angle between two real vectors.

2 Specification

double precision FUNCTION F06FAF(N, J, TOLX, X, INCX, TOLY, Y, INCY)
 INTEGER N, J, INCX, INCY
double precision TOLX, X(*), TOLY, Y(*)

3 Description

F06FAF returns, via the function name, the cosine of the angle between two n element real vectors x and y , given by the expression

$$\frac{x^T y}{\|x\|_2 \|y\|_2}.$$

If $1 \leq j \leq n$, y is taken to be the unit vector e_j , in which case the array Y is not referenced.

If $\|x\|_2 \leq \text{tolx}$, the routine returns 2.0; if $\|x\|_2 > \text{tolx}$ but $\|y\|_2 \leq \text{toly}$, the routine returns -2.0 ; otherwise the value returned is in the range $(-1.0, 1.0)$.

4 References

None.

5 Parameters

- 1: N – INTEGER *Input*
On entry: n , the number of elements in x and y .
- 2: J – INTEGER *Input*
On entry: if the vector y is supplied in Y, J should be set to 0. Otherwise, J specifies the index j of the unit vector e_j to be used as y .
- 3: TOLX – ***double precision*** *Input*
On entry: the value tolx , used to determine whether $\|x\|_2$ is effectively zero.
 If TOLX is negative, the value zero is used.
- 4: X(*) – ***double precision*** array *Input*
Note: the dimension of the array X must be at least $1 + (N - 1)|\text{INCX}|$.
On entry: the incremented array X must contain the n element vector x .
- 5: INCX – INTEGER *Input*
On entry: the increment in the subscripts of X between successive elements of x .

- 6: TOLY – *double precision* *Input*
On entry: the value *toly*, used to determine whether $\|y\|_2$ is effectively zero.
If TOLY is negative, the value zero is used.
- 7: Y(*) – *double precision* array *Input*
Note: the dimension of the array Y must be at least $1 + (N - 1)|\text{INCY}|$.
On entry: if $1 \leq J \leq N$, Y is not referenced. Otherwise, Y holds the vector *y*.
- 8: INCY – INTEGER *Input*
On entry: the increment in the subscripts of Y between successive elements of *y*.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

None.
