

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

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

None.

4 References

None.

5 Parameters

- | | | |
|----|--|--------------|
| 1: | N – INTEGER | <i>Input</i> |
| | <i>On entry:</i> n , the number of elements in x and y . | |
| 2: | J – INTEGER | <i>Input</i> |
| | <i>On entry:</i> 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 – <i>double precision</i> | <i>Input</i> |
| | <i>On entry:</i> the value $\text{tol}x$, used to determine whether $\ x\ _2$ is effectively zero. If TOLX is negative, the value zero is used. | |
| 4: | X(*) – <i>double precision</i> array | <i>Input</i> |
| | <i>On entry:</i> the vector x . | |
| 5: | INCX – INTEGER | <i>Input</i> |
| | <i>On entry:</i> the increment in the subscripts of X between successive elements of x . | |

- 6: TOLY – *double precision* *Input*
On entry: the value *tol**y*, used to determine whether $\|y\|_2$ is effectively zero. If TOLY is negative, the value zero is used.
- 7: Y(*) – *double precision* array *Input*
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.
