

# NAG Library Routine Document

## F06EXF (DROTI)

**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

F06EXF (DROTI) applies a real plane rotation to a sparse real vector and a real vector.

### 2 Specification

```
SUBROUTINE F06EXF (NZ, X, INDX, Y, C, S)
  INTEGER          NZ, INDX(*)
  REAL (KIND=nag_wp) X(*), Y(*), C, S
```

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

### 3 Description

F06EXF (DROTI) applies a real plane rotation to a sparse real vector  $x$  stored in compressed form and a real vector  $y$  in full storage form:

$$\begin{pmatrix} x^T \\ y^T \end{pmatrix} \leftarrow \begin{pmatrix} c & s \\ -s & c \end{pmatrix} \begin{pmatrix} x^T \\ y^T \end{pmatrix}.$$

The plane rotation has the form generated by F06AAF (DROTG) or F06BAF.

### 4 References

Dodson D S, Grimes R G and Lewis J G (1991) Sparse extensions to the Fortran basic linear algebra subprograms *ACM Trans. Math. Software* **17** 253–263

### 5 Arguments

- 1: NZ – INTEGER *Input*  
*On entry:* the number of nonzeros in the sparse vector  $x$ .
- 2: X(\*) – REAL (KIND=nag\_wp) array *Input/Output*  
**Note:** the dimension of the array X must be at least  $\max(1, \text{NZ})$ .  
*On entry:* the nonzero elements of the sparse vector  $x$ .  
*On exit:* the transformed vector  $x$ .
- 3: INDX(\*) – INTEGER array *Input*  
**Note:** the dimension of the array INDX must be at least  $\max(1, \text{NZ})$ .  
*On entry:*  $\text{INDX}(i)$  must contain the index of  $X(i)$  in the sparse vector  $x$ , for  $i = 1, 2, \dots, \text{NZ}$ .  
*Constraint:* the indices must be distinct.
- 4: Y(\*) – REAL (KIND=nag\_wp) array *Input/Output*  
**Note:** the dimension of the array Y must be at least  $\max_k \{\text{INDX}(k)\}$ .  
*On entry:* the vector  $y$ . Only the elements corresponding to indices in INDX are referenced.

*On exit:* the transformed vector  $y$ . Only elements corresponding to indices in INDX are altered.

5: C – REAL (KIND=nag\_wp) *Input*

*On entry:* the value  $c$ , the cosine of the rotation.

6: S – REAL (KIND=nag\_wp) *Input*

*On entry:* the value  $s$ , the sine of the rotation.

## 6 Error Indicators and Warnings

None.

## 7 Accuracy

Not applicable.

## 8 Parallelism and Performance

F06EXF (DROTI) is not threaded in any implementation.

## 9 Further Comments

None.

## 10 Example

None.

---