NAG Library Routine Document

F16JTF (BLAS_ZAMIN_VAL)

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

F16JTF (BLAS_ZAMIN_VAL) computes, with respect to absolute value, the smallest component of a complex vector, along with the index of that component.

2 Specification

```
SUBROUTINE F16JTF(N, X, INCX, K, R)
INTEGER              N, INCX, K
double precision     R
complex*16           X(1+(N-1)*ABS(INCX))
```

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

3 Description

F16JTF (BLAS_ZAMIN_VAL) computes, with respect to absolute value, the smallest component, r, of an n-element complex vector x, and determines the smallest index, k, such that

$$r = |\mathrm{Re}\, x_k| + |\mathrm{Im}\, x_k| = \min_j |\mathrm{Re}\, x_j| + |\mathrm{Im}\, x_j|.$$

4 References

Basic Linear Algebra Subprograms Technical (BLAST) Forum (2001) *Basic Linear Algebra Subprograms Technical (BLAST) Forum Standard* University of Tennessee, Knoxville, Tennessee URL: http://www.netlib.org/blas/blast-forum/blas-report.pdf

5 Parameters

1: N – INTEGER *Input*

On entry: n, the number of elements in x.

2: X($1 + (\mathrm{N} - 1) \times |\mathrm{INCX}|$) – ***complex*16*** array *Input*

On entry: the vector x. Element x_i is stored in X($1 + (i-1) \times |\mathrm{INCX}|$), for $i = 1, 2, \ldots, n$.

3: INCX – INTEGER *Input*

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

Constraint: INCX $\neq 0$.

4: K – INTEGER *Output*

On exit: k, the index, from the set $\{1, 1 + |\mathrm{INCX}|, \ldots, 1 + (\mathrm{N} - 1) \times |\mathrm{INCX}|\}$, of the smallest component of x with respect to absolute value. If N ≤ 0 on input then K is returned as 0.

5: R – ***double precision*** *Output*

On exit: r, the smallest component of x with respect to absolute value. If N ≤ 0 on input then R is returned as 0.0.

6 Error Indicators and Warnings

If INCX $= 0$, an error message is printed and program execution is terminated.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

This example computes the smallest component with respect to absolute value and index of that component for the vector

$$x = (-4 + 2.1i, 3.7 + 4.5i, -6 + 1.2i)^{\mathrm{T}}.$$

9.1 Program Text

```
*     F16JTF Example Program Text
*     Mark 22 Release. NAG Copyright 2007.
*     .. Parameters ..
      INTEGER          NIN, NOUT
      PARAMETER        (NIN=5,NOUT=6)
      INTEGER          NMAX, INCMAX
      PARAMETER        (NMAX=10,INCMAX=NMAX)
*     .. Local Scalars ..
      DOUBLE PRECISION R
      INTEGER          I, INCX, K, N
*     .. Local Arrays ..
      COMPLEX *16      X(1+(NMAX-1)*ABS(INCMAX))
*     .. External Subroutines ..
      EXTERNAL         BLAS_ZAMIN_VAL
*     .. Intrinsic Functions ..
      INTRINSIC        ABS
*     .. Executable Statements ..
      CONTINUE
*
      WRITE (NOUT,*) 'F16JTF/BLAS_ZAMIN_VAL Example Program Results'
*
*     Skip heading in data file
*
      READ (NIN,*)
*
*     Read N and INCX from data file
*
      READ (NIN,*) N, INCX
*
      IF (N.LE.NMAX .AND. ABS(INCX).LE.INCMAX) THEN
*
*        Read X from data file
*
         READ (NIN,*) (X(I),I=1,1+(N-1)*ABS(INCX),INCX)
*
*        Find K = ARGMIN(ABS(Re(X))+ABS(Im(X))) and
*             R = MIN(ABS(Re(X))+ABS(Im(X))).
*
         CALL BLAS_ZAMIN_VAL(N,X,INCX,K,R)
*
         WRITE (NOUT,*)
         WRITE (NOUT,99999) K
         WRITE (NOUT,99998) R
```

```
      END IF
*
99999 FORMAT (1X,'Index of absolutely smallest component of X is',I3)
99998 FORMAT (1X,'Absolutely smallest value is',F12.5)
      END
```

9.2 Program Data

```
F16JTF/BLAS_ZAMIN_VAL Example Program Data
  3  1                                                  : N and INCX
  (-4., 2.1)   ( 3.7, 4.5)   (-6., 1.2)                 : X
```

9.3 Program Results

```
 F16JTF/BLAS_ZAMIN_VAL Example Program Results

 Index of absolutely smallest component of X is  1
 Absolutely smallest value is     6.10000
```