

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

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

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 + (N – 1) × |INCX|) – **complex*16** array *Input*
On entry: the vector x . Element x_i is stored in X(1 + (i – 1) × |INCX|), for $i = 1, 2, \dots, n$.
- 3: INCX – INTEGER *Input*
On entry: the increment in the subscripts of X between successive elements of x .
Constraint: INCX ≠ 0.
- 4: K – INTEGER *Output*
On exit: k , the index, from the set $\{1, 1 + |\operatorname{INCX}|, \dots, 1 + (N - 1) \times |\operatorname{INCX}|\}$, of the smallest component of x with respect to absolute value. If $N \leq 0$ 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 $N \leq 0$ on input then R is returned as 0.0.

6 Error Indicators and Warnings

If $\text{INCX} = 0$, 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

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

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
```
