

NAG Library Routine Document

F16GHF (BLAS_ZWAXPBY)

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

F16GHF (BLAS_ZWAXPBY) performs scaled vector addition, for complex vectors and scalars.

2 Specification

```
SUBROUTINE F16GHF(N, ALPHA, X, INCX, BETA, Y, INCY, W, INCW)
  INTEGER          N, INCX, INCY, INCW
  complex*16      ALPHA, X(1+(N-1)*ABS(INCX)), BETA, Y(1+(N-
1) *ABS(INCY)), W(1+(N-1)*ABS(INCW))
```

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

3 Description

F16GHF (BLAS_ZWAXPBY) performs the operation

$$w \leftarrow \alpha x + \beta y,$$

where x and y are n -element complex vectors, and α and β are complex scalars.

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 , y and w .
- 2: ALPHA – ***complex*16*** *Input*
On entry: the scalar α .
- 3: 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 $i = 1, 2, \dots, n$.
- 4: INCX – INTEGER *Input*
On entry: the increment in the subscripts of X between successive elements of x .
Constraint: INCX ≠ 0.
- 5: BETA – ***complex*16*** *Input*
On entry: the scalar β .
- 6: Y(1 + (N – 1) × |INCY|) – ***complex*16*** array *Input*
On entry: the vector y . Element y_i is stored in Y(1 + (i – 1) × |INCY|), for $i = 1, 2, \dots, n$.

- 7: INCY – INTEGER *Input*
On entry: the increment in the subscripts of Y between successive elements of y .
Constraint: $\text{INCY} \neq 0$.
- 8: $W(1 + (N - 1) \times |\text{INCW}|)$ – *complex*16* array *Output*
On exit: w , the result of the scaled-vector addition. Element w_i is stored in $W(1 + (i - 1) \times |\text{INCW}|)$, for $i = 1, 2, \dots, n$.
- 9: INCW – INTEGER *Input*
On entry: the increment in the subscripts of W between successive elements of w .
Constraint: $\text{INCW} \neq 0$.

6 Error Indicators and Warnings

If $\text{INCX} = 0$ or $\text{INCY} = 0$ or $\text{INCW} = 0$, an error message is printed and program execution is terminated.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

This example computes the result of a scaled-vector addition for

$$\begin{aligned} \alpha &= 3 + 2i, & x &= (-4 + 2.1i, 3.7 + 4.5i, -6 + 1.2i)^T, \\ \beta &= -i, & y &= (-3 - 2.4i, 6.4 - 5i, -5.1)^T. \end{aligned}$$

9.1 Program Text

```
*      F16GHF 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 ..
      COMPLEX *16      ALPHA, BETA
      INTEGER          I, INCW, INCX, INCY, N
*      .. Local Arrays ..
      COMPLEX *16      W(1+(NMAX-1)*ABS(INCMAX)),
+                     X(1+(NMAX-1)*ABS(INCMAX)),
+                     Y(1+(NMAX-1)*ABS(INCMAX))
*      .. External Subroutines ..
      EXTERNAL        BLAS_ZWAXPBY
*      .. Intrinsic Functions ..
      INTRINSIC        ABS
*      .. Executable Statements ..
      CONTINUE

*
      WRITE (NOUT,*) 'F16GHF/BLAS_ZWAXPBY Example Program Results'
*
*      Skip heading in data file
*
      READ (NIN,*)
```

```

*      Read N from data file
*
      READ (NIN,*) N
*
*      Read INCX, INCY and INCW from data file
*
      READ (NIN,*) INCX, INCY, INCW
*
      IF (N.LE.NMAX .AND. ABS(INCX).LE.INCMAX .AND. ABS(INCY)
+       .LE.INCMAX .AND. ABS(INCW).LE.INCMAX) THEN
*
*      Read ALPHA and BETA from data file
*
      READ (NIN,*) ALPHA, BETA
*
*      Read X and Y from data file
*
      READ (NIN,*) (X(I),I=1,1+(N-1)*ABS(INCX),INCX)
      READ (NIN,*) (Y(I),I=1,1+(N-1)*ABS(INCY),INCY)
*
*      Compute W = ALPHA*X + BETA*Y
*
      CALL BLAS_ZWAXPBY(N,ALPHA,X,INCX,BETA,Y,INCY,W,INCW)
*
      WRITE (NOUT,*)
      WRITE (NOUT,99999)
      WRITE (NOUT,99998) (W(I),I=1,N)
      END IF
*
99999 FORMAT (1X,'Result of scaled vector addition is')
99998 FORMAT (1X,'W = ( ',2('(',F9.4,',',F9.4,')','),','(',F9.4,',',F9.4,
+       ')')')
      END

```

9.2 Program Data

F16GHF/BLAS_ZWAXPBY Example Program Data

3	:	N
1 1 1	:	INCX, INCY and INCW
(3., 2.) (0.,-1.)	:	ALPHA and BETA
(-4., 2.1) (3.7, 4.5) (-6., 1.2)	:	X
(-3.,-2.4) (6.4,-5.) (-5.1,0.)	:	Y

9.3 Program Results

F16GHF/BLAS_ZWAXPBY Example Program Results

Result of scaled vector addition is
W = ((-18.6000, 1.3000), (-2.9000, 14.5000), (-20.4000, -3.3000))