

NAG Toolbox for MATLAB

m01ed

1 Purpose

m01ed rearranges a vector of complex numbers into the order specified by a vector of ranks.

2 Syntax

```
[cv, irank, ifail] = m01ed(cv, m1, irank, 'm2', m2)
```

3 Description

m01ed is designed to be used typically in conjunction with the M01D ranking functions. After one of the M01D functions has been called to determine a vector of ranks, m01ed can be called to rearrange a vector of complex numbers into the rank order. If the vector of ranks has been generated in some other way, then m01zb should be called to check its validity before m01ed is called.

4 References

None.

5 Parameters

5.1 Compulsory Input Parameters

1: **cv(m2)** – complex array

Elements **m1** to **m2** of **cv** must contain complex values to be rearranged.

2: **m1** – int32 scalar

m1 and **m2** must specify the range of the ranks supplied in **irank** and the elements of **cv** to be rearranged.

Constraint: $0 < \mathbf{m1} \leq \mathbf{m2}$.

3: **irank(m2)** – int32 array

Elements **m1** to **m2** of **irank** must contain a permutation of the integers **m1** to **m2**, which are interpreted as a vector of ranks.

5.2 Optional Input Parameters

1: **m2** – int32 scalar

Default: The dimension of the arrays **irank**, **cv**. (An error is raised if these dimensions are not equal.)

m1 and **m2** must specify the range of the ranks supplied in **irank** and the elements of **cv** to be rearranged.

Constraint: $0 < \mathbf{m1} \leq \mathbf{m2}$.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **cv(m2)** – complex array

These values are rearranged into rank order. For example, if **irank**(*i*) = **m1**, then the initial value of **cv**(*i*) is moved to **cv**(**m1**).

2: **irank(m2)** – int32 array

Used as internal workspace prior to being restored and hence is unchanged.

3: **ifail** – int32 scalar

0 unless the function detects an error (see Section 6).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

ifail = 1

On entry, **m2** < 1,
or **m1** < 1,
or **m1** > **m2**.

ifail = 2

Elements **m1** to **m2** of **irank** contain a value outside the range **m1** to **m2**.

ifail = 3

Elements **m1** to **m2** of **irank** contain a repeated value.

If **ifail** = 2 or 3, elements **m1** to **m2** of **irank** do not contain a permutation of the integers **m1** to **m2**. On exit, the contents of **cv** may be corrupted. To check the validity of **irank** without the risk of corrupting **cv**, use **m01zb**.

7 Accuracy

Not applicable.

8 Further Comments

The average time taken by the function is approximately proportional to *n*, where *n* = **m2** – **m1** + 1.

9 Example

```
cv = [complex(6, +1);
      complex(5, -3);
      complex(2, +2);
      complex(4, +2);
      complex(4, +0);
      complex(4, -8);
      complex(3, -3);
      complex(2, +4);
      complex(1, +1);
      complex(9, +1);
      complex(6, -1);
      complex(4, -5)];
m1 = int32(1);
irank = [int32(7);
         int32(1);
```

```
int32(3);
int32(11);
int32(10);
int32(6);
int32(9);
int32(5);
int32(8);
int32(4);
int32(2);
int32(12)];
[cvOut, irankOut, ifail] = m01ed(cv, m1, irank)
```

```
cvOut =
  5.0000 - 3.0000i
  6.0000 - 1.0000i
  2.0000 + 2.0000i
  9.0000 + 1.0000i
  2.0000 + 4.0000i
  4.0000 - 8.0000i
  6.0000 + 1.0000i
  1.0000 + 1.0000i
  3.0000 - 3.0000i
  4.0000
  4.0000 + 2.0000i
  4.0000 - 5.0000i
irankOut =
      7
      1
      3
     11
     10
      6
      9
      5
      8
      4
      2
     12
ifail =
      0
```