NAG Toolbox for MATLAB

x04cf

1   Purpose

x04cf prints a double band matrix stored in a packed two-dimensional array.

2   Syntax

```
[ifail] = x04cf(m, n, kl, ku, a, form, title, labrow, rlabs, labcol,
clabs, ncols, indent)
```

3   Description

x04cf prints a double band matrix stored in a packed two-dimensional array, using a format specifier supplied by you. The matrix is output to the unit defined by x04ab.

4   References

None.

5   Parameters

5.1   Compulsory Input Parameters

1:    **m – int32 scalar**
2:    **n – int32 scalar**

The number of rows and columns of the band matrix, respectively, to be printed.

If either **m** or **n** is less than 1, x04cf will exit immediately after printing **title**; no row or column labels are printed.

3:    **kl – int32 scalar**

The number of subdiagonals of the band matrix A.

Constraint: $\mathbf{kl} \geq 0$.

4:    **ku – int32 scalar**

The number of superdiagonals of the band matrix A.

Constraint: $\mathbf{ku} \geq 0$.

5:    **a(lda,∗) – double array**

The first dimension of the array **a** must be at least $\mathbf{kl} + \mathbf{ku} + 1$

The second dimension of the array must be at least $\max(1, \min(\mathbf{m} + \mathbf{ku}, \mathbf{n}))$

The band matrix to be printed.

The matrix is stored in rows 1 to $k_l + k_u + 1$, more precisely, the element A_{ij} must be stored in

$$\mathbf{a}(k_u + 1 + i - j, j) \qquad \text{for } \max(1, j - k_u) \leq i \leq \min(m, j + k_l).$$

6:     **form – string**

A valid Fortran format code. This may be any format code allowed on the system, whether it is standard Fortran or not. **form** is used to print elements of the matrix *A*. It may or may not be enclosed in brackets. Examples of valid values for **form** are '*F*11.4', '1*PE*13.5', '*G*14.5'.

In addition, there are two special codes which force x04cf to choose its own format code:

form = ' '

x04cf will choose a format code such that numbers will be printed with either an F8.4, an F11.4 or a 1PE13.4 format. The F8.4 code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 1.0. The F11.4 code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 9999.9999. Otherwise the 1PE13.4 code is chosen.

form = *

x04cf will choose a format code such that numbers will be printed to as many significant digits as are necessary to distinguish between neighbouring machine numbers. Thus any two numbers that are stored with different internal representations should look different on output. Whether they do in fact look different will depend on the run-time library of the Fortran compiler in use.

Constraint: the character length of **form** must be ≤ 80.

7:     **title – string**

A title to be printed above the matrix.

If **title** = ' ', no title (and no blank line) will be printed.

If **title** contains more than **ncols** characters, the contents of **title** will be wrapped onto more than one line, with the break after **ncols** characters.

Any trailing blank characters in **title** are ignored.

8:     **labrow – string**

Indicates the type of labelling to be applied to the rows of the matrix.

labrow = 'N'

Prints no row labels.

labrow = 'I'

Prints integer row labels.

labrow = 'C'

Prints character labels, which must be supplied in array **rlabs**.

Constraint: **labrow** = 'N', 'I' or 'C'.

9:     **rlabs**(*) **– string array**

Note: the dimension of the array **rlabs** must be at least **m** if **labrow** = 'C', and at least 1 otherwise.

If **labrow** = 'C', must contain labels for the rows of the matrix.

Labels are right-justified when output, in a field which is as wide as necessary to hold the longest row label. Note that this field width is subtracted from the number of usable columns, **ncols**.

10:    **labcol – string**

Indicates the type of labelling to be applied to the columns of the matrix.

labcol = 'N'

> Prints no column labels.

labcol = 'I'

> Prints integer column labels.

labcol = 'C'

> Prints character labels, which must be supplied in array **clabs**.

Constraint: **labcol** = 'N', 'I' or 'C'.

11: **clabs**(∗) **– string array**

Note: the dimension of the array **clabs** must be at least **n** if **labcol** = 'C', and at least 1 otherwise.

If **labcol** = 'C', must contain labels for the columns of the matrix.

Labels are right-justified when output. Any label that is too long for the column width, which is determined by **form**, is truncated.

12: **ncols – int32 scalar**

The maximum output record length. If the number of columns of the matrix is too large to be accommodated in **ncols** characters, the matrix will be printed in parts, containing the largest possible number of matrix columns, and each part separated by a blank line.

ncols must be large enough to hold at least one column of the matrix using the format specifier in **form**. If a value less than 0 or greater than 132 is supplied for **ncols**, then the value 80 is used instead.

13: **indent – int32 scalar**

The number of columns by which the matrix (and any title and labels) should be indented. The effective value of **ncols** is reduced by **indent** columns. If a value less than 0 or greater than **ncols** is supplied for **indent**, the value 0 is used instead.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

lda

5.4 Output Parameters

1: **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, **kl** < 0.

ifail = 2

> On entry, **ku** < 0.

ifail = 3

On entry, **lda** < **kl** + **ku** + 1.

ifail = 4

On entry, variable **form** is more than 80 characters long.

ifail = 5

The code supplied in **form** cannot be used to output a number. **form** probably has too wide a field width or contains an illegal edit descriptor.

ifail = 6

On entry, either **labrow** or **labcol** ≠ 'N', 'I' or 'C'.

ifail = 7

The quantity **ncols** − **indent** − *labwid* (where *labwid* is the width needed for the row labels) is not large enough to hold at least one column of the matrix.

7   Accuracy

Not applicable.

8   Further Comments

None.

9   Example

```
m = int32(5);
n = int32(5);
kl = int32(1);
ku = int32(1);
a = [11, 12, 13, 14, 15;
     21, 22, 23, 24, 25;
     31, 32, 33, 34, 35];
format = ' ';
title = 'Example 1:';
labrow = 'Integer';
rlabs = {'Uno     '};
labcol = 'Integer';
clabs = {'Un      '};
ncols = int32(80);
indent = int32(0);
[ifail] = ...
     x04cf(m, n, kl, ku, a, format, title, labrow, rlabs, labcol, clabs,
ncols, indent)
```
```
Example 1:
             1           2           3           4           5
  1      21.0000     12.0000
  2      31.0000     22.0000     13.0000
  3                  32.0000     23.0000     14.0000
  4                              33.0000     24.0000     15.0000
  5                                          34.0000     25.0000
ifail =
          0
```