NAG Library Function Document

nag_band_real_mat_print (x04cec)

1 Purpose

nag_band_real_mat_print (x04cec) is an easy-to-use function to print a double band matrix.

2 Specification

```c
#include <nag.h>
#include <nagx04.h>
void nag_band_real_mat_print (Nag_OrderType order, Integer m, Integer n,
                           Integer kl, Integer ku, const double a[], Integer pda,
                           const char *title, const char *outfile, NagError *fail)
```

3 Description

nag_band_real_mat_print (x04cec) prints a double band matrix stored in packed form. It is an easy-to-use driver for nag_band_real_mat_print_comp (x04cfc). The function uses default values for the format in which numbers are printed, for labelling the rows and columns, and for output record length.

nag_band_real_mat_print (x04cec) will choose a format code such that numbers will be printed with a `%.8f`, a `%.11f` or a `%.13e` format. The `%.8f` code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 1.0. The `%.11f` code is chosen if the sizes of all the matrix elements to be printed lie between 0.001 and 9999.9999. Otherwise the `%.13e` code is chosen.

The matrix is printed with integer row and column labels, and with a maximum record length of 80. The matrix is output to the file specified by `outfile` or, by default, to standard output.

4 References

None.

5 Arguments

1: `order` – Nag_OrderType

   On entry: the `order` argument specifies the two-dimensional storage scheme being used, i.e., row-major ordering or column-major ordering. C language defined storage is specified by `order = Nag_RowMajor`. See Section 3.2.1.3 in the Essential Introduction for a more detailed explanation of the use of this argument.

   Constraint: `order` = Nag_RowMajor or Nag_ColMajor.

2: `m` – Integer

3: `n` – Integer

   On entry: the number of rows and columns of the band matrix, respectively, to be printed.

   If either `m` or `n` is less than 1, nag_band_real_mat_print (x04cec) will exit immediately after printing `title`; no row or column labels are printed.

4: `kl` – Integer

   On entry: the number of subdiagonals of the band matrix A.

   Constraint: `kl` ≥ 0.
5: \( \text{ku} \) – Integer

\textit{Input}

\textit{On entry:} the number of superdiagonals of the band matrix \( A \).

\textit{Constraint:} \( \text{ku} \geq 0 \).

6: \( \text{a}[\text{dim}] \) – const double

\textit{Input}

\textit{Note:} the dimension, \( \text{dim} \), of the array \( \text{a} \) must be at least

\[ \max(1, \text{pda} \times \text{n}) \text{ when order} = \text{Nag\_ColMajor}; \]

\[ \max(1, \text{m} \times \text{pda}) \text{ when order} = \text{Nag\_RowMajor}. \]

\textit{On entry:} the band matrix to be printed.

This is stored as a notional two-dimensional array with row elements or column elements stored contiguously. The storage of elements \( A_{ij} \), for row \( i = 1, \ldots, m \) and column \( j = \max(1, i - k_i), \ldots, \min(n, i + k_u) \), depends on the \textit{order} argument as follows:

- if \( \text{order} = \text{Nag\_ColMajor}, A_{ij} \) is stored as \( \text{a}[(j - 1) \times \text{pda} + \text{ku} + i - j] \);
- if \( \text{order} = \text{Nag\_RowMajor}, A_{ij} \) is stored as \( \text{a}[(i - 1) \times \text{pda} + \text{kl} + j - i] \).

7: \( \text{pda} \) – Integer

\textit{Input}

\textit{On entry:} the stride separating row or column elements (depending on the value of \textit{order}) of the matrix \( A \) in the array \( \text{a} \).

\textit{Constraint:} \( \text{pda} \geq \text{kl} + \text{ku} + 1 \).

8: \( \text{title} \) – const char *

\textit{Input}

\textit{On entry:} a title to be printed above the matrix.

If \( \text{title} = \text{NULL} \), no title (and no blank line) will be printed.

If \( \text{title} \) contains more than 80 characters, the contents of \( \text{title} \) will be wrapped onto more than one line, with the break after 80 characters.

Any trailing blank characters in \( \text{title} \) are ignored.

9: \( \text{outfile} \) – const char *

\textit{Input}

\textit{On entry:} the name of a file to which output will be directed. If \( \text{outfile} \) is \text{NULL} the output will be directed to standard output.

10: \( \text{fail} \) – NagError *

\textit{Input/Output}

The NAG error argument (see Section 3.6 in the Essential Introduction).

6 \ Error Indicators and Warnings

\textbf{NE\_ALLOC\_FAIL}

Memory allocation failed.

\textbf{NE\_BAD\_PARAM}

On entry, argument \( \langle \text{value} \rangle \) had an illegal value.

\textbf{NE\_INTERNAL\_ERROR}

An internal error has occurred in this function. Check the function call and any array sizes. If the call is correct then please contact NAG for assistance.
**NE_NOT_APPEND_FILE**
Cannot open file \texttt{value} for appending.

**NE_NOT_CLOSE_FILE**
Cannot close file \texttt{value}.

**NE_NOT_WRITE_FILE**
Cannot open file \texttt{value} for writing.

7 **Accuracy**
Not applicable.

8 **Parallelism and Performance**
Not applicable.

9 **Further Comments**
A call to \texttt{nag_band_real_mat_print} (x04cec) is equivalent to a call to \texttt{nag_band_real_mat_print_comp} (x04cfc) with the following argument values:

\begin{verbatim}
ncols = 80
indent = 0
labrow = Nag_IntegerLabels
labcol = Nag_IntegerLabels
form = 0
\end{verbatim}

10 **Example**
See Section 10 in \texttt{nag_dpbtrf} (f07hdc).