NAG Library Routine Document

D02NPF

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

D02NPF is a setup routine which you must call prior to D02NEF and after a call to D02MWF, if the Jacobian is to be considered as having a banded structure.

2 Specification

```
SUBROUTINE D02NPF (NEQ, ML, MU, ICOM, LICOM, IFAIL)
INTEGER NEQ, ML, MU, ICOM(LICOM), LICOM, IFAIL
```

3 Description

A call to D02NPF specifies that the Jacobian to be used is banded in structure. If D02NPF is not called before a call to D02NEF then the Jacobian is assumed to be full.

4 References

None.

5 Arguments

1:   NEQ – INTEGER   *Input*

   On entry: the number of differential-algebraic equations to be solved.

   Constraint: $1 \le \text{NEQ}$.

2:   ML – INTEGER   *Input*

   On entry: m_L, the number of subdiagonals in the band.

   Constraint: $0 \le \text{ML} \le \text{NEQ} - 1$.

3:   MU – INTEGER   *Input*

   On entry: m_U, the number of superdiagonals in the band.

   Constraint: $0 \le \text{MU} \le \text{NEQ} - 1$.

4:   ICOM(LICOM) – INTEGER array   *Communication Array*

   ICOM is used to communicate details of the integration from D02MWF and details of the banded structure of the Jacobian to D02NEF.

5:   LICOM – INTEGER   *Input*

   On entry: the dimension of the array ICOM as declared in the (sub)program from which D02NPF is called.

   Constraint: $\text{LICOM} \ge 50 + \text{NEQ}$.

6:    IFAIL − INTEGER   *Input/Output*

> *On entry*: IFAIL must be set to 0, −1 or 1. If you are unfamiliar with this argument you should refer to Section 3.4 in How to Use the NAG Library and its Documentation for details.
>
> For environments where it might be inappropriate to halt program execution when an error is detected, the value −1 or 1 is recommended. If the output of error messages is undesirable, then the value 1 is recommended. Otherwise, if you are not familiar with this argument, the recommended value is 0. **When the value −1 or 1 is used it is essential to test the value of IFAIL on exit.**
>
> *On exit*: IFAIL = 0 unless the routine detects an error or a warning has been flagged (see Section 6).

6   Error Indicators and Warnings

If on entry IFAIL = 0 or −1, explanatory error messages are output on the current error message unit (as defined by X04AAF).

Errors or warnings detected by the routine:

IFAIL = 1

> On entry, NEQ = $\langle value \rangle$.
> Constraint: NEQ $\geq$ 1.

IFAIL = 2

> On entry, ML = $\langle value \rangle$.
> Constraint: ML $\geq$ 0.
>
> On entry, ML = $\langle value \rangle$ and NEQ = $\langle value \rangle$.
> Constraint: ML $\leq$ NEQ − 1.

IFAIL = 3

> On entry, MU = $\langle value \rangle$.
> Constraint: MU $\geq$ 0.
>
> On entry, MU = $\langle value \rangle$ and NEQ = $\langle value \rangle$.
> Constraint: MU $\leq$ NEQ − 1.

IFAIL = 4

> Either the initialization routine has not been called prior to the first call of this routine or the communication array has become corrupted.

IFAIL = 5

> On entry, LICOM is too small: LICOM = $\langle value \rangle$.

IFAIL = −99

> An unexpected error has been triggered by this routine. Please contact NAG.
>
> See Section 3.9 in How to Use the NAG Library and its Documentation for further information.

IFAIL = −399

> Your licence key may have expired or may not have been installed correctly.
>
> See Section 3.8 in How to Use the NAG Library and its Documentation for further information.

IFAIL = −999

Dynamic memory allocation failed.

See Section 3.7 in How to Use the NAG Library and its Documentation for further information.

7 Accuracy

Not applicable.

8 Parallelism and Performance

D02NPF is not threaded in any implementation.

9 Further Comments

None.

10 Example

See Section 10 in D02NEF and D02MWF.