

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 Parameters

- | | | |
|----|---|----------------------------|
| 1: | NEQ – INTEGER | <i>Input</i> |
| | <i>On entry:</i> the number of differential-algebraic equations to be solved. | |
| | <i>Constraint:</i> $1 \leq \text{NEQ}$. | |
| 2: | ML – INTEGER | <i>Input</i> |
| | <i>On entry:</i> m_L , the number of subdiagonals in the band. | |
| | <i>Constraint:</i> $0 \leq \text{ML} \leq \text{NEQ} - 1$. | |
| 3: | MU – INTEGER | <i>Input</i> |
| | <i>On entry:</i> m_U , the number of superdiagonals in the band. | |
| | <i>Constraint:</i> $0 \leq \text{MU} \leq \text{NEQ} - 1$. | |
| 4: | ICOM(LICOM) – INTEGER array | <i>Communication Array</i> |
| | 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 | <i>Input</i> |
| | <i>On entry:</i> the dimension of the array ICOM as declared in the (sub)program from which D02NPF is called. | |
| | <i>Constraint:</i> $\text{LICOM} \geq 50 + \text{NEQ}$. | |

6: IFAIL – INTEGER

Input/Output

On entry: IFAIL must be set to 0, -1 or 1. If you are unfamiliar with this parameter you should refer to Section 3.3 in the Essential Introduction 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 parameter, 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 3.8 in the Essential Introduction for further information.

IFAIL = -399

Your licence key may have expired or may not have been installed correctly.
See Section 3.7 in the Essential Introduction for further information.

IFAIL = -999

Dynamic memory allocation failed.

See Section 3.6 in the Essential Introduction for further information.

7 Accuracy

Not applicable.

8 Parallelism and Performance

Not applicable.

9 Further Comments

None.

10 Example

See Section 10 in D02NEF and D02MWF.
