NAG Fortran Library Routine Document

D02LYF

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

D02LYF is a diagnostic routine which may be called after a call of the integrator D02LAF.

2 Specification

```
SUBROUTINE D02LYF(NEQ, HNEXT, HUSED, HSTART, NSUCC, NFAIL, NATT, THRES,
1                 THRESP, RWORK, LRWORK, IFAIL)
INTEGER           NEQ, NSUCC, NFAIL, NATT, LRWORK, IFAIL
real              HNEXT, HUSED, HSTART, THRES(NEQ), THRESP(NEQ),
1                 RWORK(LRWORK)
```

3 Description

This routine permits the user to extract information about the performance of D02LAF and the setting of some optional parameters. It may be called only after a call of D02LAF.

4 References

None.

5 Parameters

1: NEQ – INTEGER *Input*

On entry: the number of second-order ordinary differential equations solved by D02LAF. It must be the same as the parameter NEQ supplied to D02LXF and D02LAF.

2: HNEXT – ***real*** *Output*

On exit: the next step size which D02LAF, if called, would attempt.

3: HUSED – ***real*** *Output*

On exit: the last successful step size used by D02LAF.

4: HSTART – ***real*** *Output*

On exit: the initial step size used on the current integration problem by D02LAF.

5: NSUCC – INTEGER *Output*

On exit: the number of steps attempted by D02LAF that have been successful since the start of the current problem.

6: NFAIL – INTEGER *Output*

On exit: the number of steps attempted by D02LAF that have failed since the start of the current problem.

7: NATT – INTEGER *Output*

On exit: the number of steps attempted before the initial step was successful. Over a large number of problems the cost of an attempted step of this type is approximately half that of a normal attempted step.

8: THRES(NEQ) – ***real*** array *Output*

On exit: the ith solution threshold value used in the error control strategy. (See D02LXF.)

9: THRESP(NEQ) – ***real*** array *Output*

On exit: the ith derivative threshold value used in the error control strategy. (See D02LXF.)

10: RWORK(LRWORK) – ***real*** array *Workspace*

This **must** be the same parameter RWORK as supplied to D02LAF. It is used to pass information from D02LAF to D02LYF and therefore the contents of this array **must not** be changed before calling D02LYF.

11: LRWORK – INTEGER *Input*

On entry: the dimension of the array RWORK as declared in the (sub)program from which D02LYF is called.

This must be the same parameter LRWORK as supplied to D02LXF.

12: IFAIL – INTEGER *Input/Output*

On entry: IFAIL must be set to 0, -1 or 1. Users who are unfamiliar with this parameter should refer to Chapter P01 for details.

On exit: IFAIL $= 0$ unless the routine detects an error (see Section 6).

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, for users 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.**

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 $= 1$

D02LAF has not been called, or one or both of the parameters NEQ and LRWORK does not match the corresponding parameter supplied to D02LXF.

This error exit can be caused if elements of RWORK have been overwritten.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

See Section 9 of the document for D02LAF.