NAG Fortran Library Routine Document

D02ZAF

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

D02ZAF calculates the weighted norm of the local error estimate from inside a MONITR routine called from an integrator in Chapter D02M/N.

2 Specification

```
real FUNCTION D02ZAF(NEQ, V, W, IFAIL)
INTEGER              NEQ, IFAIL
real                 V(NEQ), W(NEQ)
```

3 Description

This function is for use with the forward communication integrators D02NBF, D02NCF, D02NDF, D02NGF, D02NHF and D02NJF and the reverse communication integrators D02NMF and D02NNF. It must be used only inside the user-supplied routine MONITR (if this option is selected) for the forward communication routines or on the equivalent return for the reverse communication routines. It may be used to evaluate the norm of the scaled local error estimate, $\|v\|$, where the weights used are contained in w and the norm used is as defined by an earlier call to the integrator setup routine (D02MVF, D02NVF or D02NWF). Its use is described under the description of MONITR in the specifications for the forward communication integrators mentioned above.

4 References

None.

5 Parameters

1: NEQ – INTEGER *Input*

On entry: the number of differential equations, as defined for the integrator being used.

2: V(NEQ) – ***real*** array *Input*

On entry: the vector, the weighted norm of which is to be evaluated by D02ZAF. V is calculated internally by the integrator being used.

3: W(NEQ) – ***real*** array *Input*

On entry: the weights, calculated internally by the integrator, to be used in the norm evaluation.

4: 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, because for this routine the values of the output parameters

may be useful even if IFAIL $\neq 0$ on exit, the recommended value is -1. **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 $= 1$

The value of the norm would either overflow or is close to overflowing. A value close to the square root of the largest number on the computer is returned.

7 Accuracy

The result is calculated close to ***machine precision*** except in the case when the routine exits with IFAIL $= 1$.

8 Further Comments

This routine should only be used within the user-supplied MONITR subroutine associated with the integrators in Chapter D02M/N. Its use and only valid calling sequence are fully documented in the description of this MONITR subroutine in the routine documents for the integrators.

9 Example

None.