

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 sub-chapter D02M/N (e.g., see D02NBF).

2 Specification

```
double precision FUNCTION D02ZAF (NEQ, V, W, IFAIL)
INTEGER                                NEQ, IFAIL
double precision                    V(NEQ), W(NEQ)
```

3 Description

D02ZAF 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 (sub)program 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) – *double precision* 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) – *double precision* array *Input*
On entry: the weights, calculated internally by the integrator, to be used in the norm evaluation.
- 4: IFAIL – INTEGER *Input/Output*
On initial entry: IFAIL must be set to 0, -1 or 1. If you are unfamiliar with this parameter you should refer to Chapter P01 for details.
On final 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

D02ZAF should only be used within the user-supplied MONITR (sub)program associated with the integrators in sub-chapter D02M/N (e.g., see D02NBF). Its use and only valid calling sequence are fully documented in the description of this MONITR (sub)program in the routine documents for the integrators.

9 Example

None.
