

NAG Toolbox for MATLAB

d02mz

1 Purpose

d02mz interpolates components of the solution of a system of first-order differential equations from information provided by the integrators in sub-chapter D02M/N.

2 Syntax

```
[sol, ifail] = d02mz(tsol, m, neq, ysav, rwork, 'sdysav', sdysav)
```

3 Description

d02mz evaluates the first **m** components of the solution of a system of ordinary differential equations at any point using natural polynomial interpolation based on information generated by the integrator. This information must be passed unchanged to d02mz. d02mz should not normally be used to extrapolate outside the range of values obtained from the above function.

4 References

See the D02M/N Sub-chapter Introduction.

5 Parameters

5.1 Compulsory Input Parameters

1: **tsol – double scalar**

The point at which the first **m** components of the solution are to be evaluated. **tsol** should not normally be an extrapolation point. Extrapolation is permitted but not recommended.

2: **m – int32 scalar**

the number of components of the solution whose values are required.

Constraint: $1 \leq m \leq neq$.

3: **neq – int32 scalar**

The value used for the parameter **neq** when calling the integrator.

Constraint: $1 \leq neq \leq ldysav$.

4: **ysav(ldysav,sdysav) – double array**

ldysav, the first dimension of the array, must be at least 1.

The values provided in the array **ysav** on return from the integrator.

5: **rwork(50 + 4 × ldysav) – double array**

The values provided in the array **rwork** on return from the integrator.

5.2 Optional Input Parameters

1: **sdysav – int32 scalar**

Default: The dimension of the array **ysav**.

the value used for the parameter **sdysav** when calling the integrator.

5.3 Input Parameters Omitted from the MATLAB Interface

ldysav

5.4 Output Parameters

1: **sol(m)** – double array

The calculated value of the solution at **tsol**.

2: **ifail** – int32 scalar

0 unless the function detects an error (see Section 6).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

ifail = 1

On entry, **m** < 1,
or **ldysav** < 1,
or **neq** < 1,
or **m** > **neq**,
or **neq** > **ldysav**.

ifail = 2

On entry, when accessing an element of the array **rwork** an unexpected quantity was found. You have not passed the correct array to d02mz or has overwritten elements of this array.

ifail = 3

On entry, d02mz has been called for extrapolation. Before returning with this error exit, the value of the solution at **tsol** is calculated and placed in **sol**.

7 Accuracy

The solution values returned will be of a similar accuracy to those computed by the integrator.

8 Further Comments

You are recommended to employ the interpolant provided by d02xk if using the backward differentiation integrator specified by calling setup function d02nv with the parameter **petzld** set to **false**.

9 Example

None.
