NAG Toolbox for MATLAB

d02pw

1 Purpose

d02pw resets the end point in an integration performed by d02pd.

2 Syntax

```
[ifail] = d02pw(tendnu)
```

3 Description

d02pw and its associated functions (d02pv, d02pd, d02px, d02py, d02pz) solve the initial value problem for a first-order system of ordinary differential equations. The functions, based on Runge–Kutta methods and derived from RKSUITE (see Brankin *et al.* 1991), integrate

$$y' = f(t,y) \qquad \text{given} \qquad y(t_0) = y_0$$

where y is the vector of n solution components and t is the independent variable.

d02pw is used to reset the final value of the independent variable, t_f, when the integration is already underway. It can be used to extend or reduce the range of integration. The new value must be beyond the current value of the independent variable (as returned in **tnow** by d02pd) in the current direction of integration. It is much more efficient to use d02pw for this purpose than to use d02pv which involves the overhead of a complete restart of the integration.

If you want to change the direction of integration then you must restart by a call to d02pv.

4 References

Brankin R W, Gladwell I and Shampine L F 1991 RKSUITE: A suite of Runge–Kutta codes for the initial value problems for ODEs *SoftReport 91-S1* Southern Methodist University

5 Parameters

5.1 Compulsory Input Parameters

1: **tendnu – double scalar**

The new value for t_f.

Constraint: sign(**tendnu** − **tnow**) = sign(**tend** − **tstart**), where **tstart** and **tend** are as supplied in the previous call to d02pv and **tnow** is returned by the preceding call to d02pd. **tendnu** must be distinguishable from **tnow** for the method and the ***machine precision*** being used..

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **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, an invalid input value for **tendnu** was detected or an invalid call to d02pw was made, for example without a previous call to the integration function d02pd. You cannot continue integrating the problem.

7 Accuracy

Not applicable.

8 Further Comments

None.

9 Example

```
tendnu = 6.283185307179586;
[ifail] = d02pw(tendnu)
```

```
ifail =
           0
```