

NAG Toolbox for MATLAB

d02nx

1 Purpose

d02nx is an optional output function which you may call, on exit from an integrator in sub-chapter D02M/N, if sparse matrix linear algebra has been selected.

2 Syntax

```
[liwreq, liwusd, lrwreq, lrwusd, nlu, nnz, ngp, isplit, igrow, nblock] =  
d02nx(icall, lblock, inform)
```

3 Description

d02nx permits you to examine the various outputs from the sparse linear algebra functions called by the integrator.

4 References

See the D02M/N Sub-chapter Introduction.

5 Parameters

5.1 Compulsory Input Parameters

1: **icall** – int32 scalar

Indicates whether or not all output parameters have been set during the call to the integrator. If so, that is, if the integrator returned with **ifail** = 0 or 12, then **icall** must be set to 0. Otherwise **icall** must be set to 1, indicating that integration did not take place due to lack of space in arrays **wkjac** and **jacpvt**, and only **liwreq**, **liwusd**, **lrwreq**, **lrwusd** have been set.

2: **lblock** – logical scalar

The value used for the parameter **lblock** when calling d02nu.

3: **inform(23)** – int32 array

Contains information supplied by the integrator.

5.2 Optional Input Parameters

None.

5.3 Input Parameters Omitted from the MATLAB Interface

None.

5.4 Output Parameters

1: **liwreq** – int32 scalar

The length of the integer workspace **jacpvt** reserved for the sparse matrix functions.

2: **liwusd** – int32 scalar

The length of the integer workspace **jacpvt** actually used by the sparse matrix functions.

3: **lrwreq – int32 scalar**

The length of the double workspace **wkjac** reserved for the sparse matrix functions.

4: **lrwusd – int32 scalar**

The length of the double workspace **wkjac** actually used by the sparse matrix functions.

5: **nlv – int32 scalar**

The number of *LU* decompositions done during the integration.

6: **nnz – int32 scalar**

The number of nonzeros in the Jacobian.

7: **ngp – int32 scalar**

The number of user-supplied (sub)program **fcn** or user-supplied (sub)program **resid** calls needed to form the Jacobian.

8: **isplit – int32 scalar**

An appropriate value for the parameter **isplit** when calling d02nu for subsequent runs of similar problems.

9: **igrow – int32 scalar**

An estimate of the growth of the elements encountered during the last *LU* decomposition performed. If the actual estimate exceeds the largest possible integer value for the machine being used (see x02bb) the **igrow** is set to the value returned by x02bb.

10: **nblock – int32 scalar**

If **lblock = true**, **nblock** contains the number of diagonal blocks in the Jacobian matrix permuted to block lower triangular form. If **nblock = 1** then on subsequent runs of a similar problem **lblock** should be set to **false** in the call to d02nu.

If **lblock = false**, **nblock = 1**.

6 Error Indicators and Warnings

None.

7 Accuracy

Not applicable.

8 Further Comments

The output from d02nx, in particular the values of **liwreq**, **liwusd**, **lrwreq**, **lrwusd**, **isplit** and **igrow**, should be used to determine appropriate values for the parameters of the setup function d02nu on further calls to the integrator for the same or similar problems.

9 Example

```
icall = int32(0);
lblock = true;
inform = [int32(55);
         int32(136);
```

```
int32(16);
int32(4);
int32(4);
int32(78);
int32(8264206);
int32(3);
int32(8);
int32(100);
int32(150);
int32(29);
int32(71);
int32(16);
int32(7);
int32(3);
int32(73);
int32(1108);
int32(1);
int32(448693);
int32(8090947);
int32(8183732);
int32(8185508)];
[liwreq, liwusd, lrwreq, lrwusd, nlu, nnz, ngp, isplit, igrow, nblock] =
d02nx(icall, lblock, inform)
```

```
liwreq =
    100
liwusd =
    150
lrwreq =
    29
lrwusd =
    71
nlu =
    16
nnz =
     7
ngp =
     3
isplit =
    73
igrow =
   1108
nblock =
     1
```