MINPACK2 applications solved by ACGSYS

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1. Elastic-Plastic Torsion Problem

```
   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Elastic-Plastic Torsion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 16, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
  40000    241     0    510    27       593 -.4392678188056E+00  .3175766014053E-04
-------------------------------------------------------------------------------
TOTAL    241     0    510    27      5.93 (seconds)    proc=    .00%

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   ***************************************************

   CGSYS Algorithm.    Elastic-Plastic Torsion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 16, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 160000    476     0    982    29      5224 -.4392942848676E+00  .4717414025057E-04
-------------------------------------------------------------------------------
TOTAL    476     0    982    29     52.24 (seconds)    proc=    .00%

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   ***************************************************

   CGSYS Algorithm.    Elastic-Plastic Torsion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 16, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 360000    705     0   1439    28     17812 -.4392992067816E+00  .5991120929404E-04
-------------------------------------------------------------------------------
TOTAL    705     0   1439    28    178.12 (seconds)    proc=    .00%

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   ***************************************************

   CGSYS Algorithm.    Elastic-Plastic Torsion Problem
```

```
   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 16, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 640000    911     0   1853    30     41307 -.4393009097428E+00  .5942626711422E-04
-------------------------------------------------------------------------------
TOTAL    911     0   1853    30    413.07 (seconds)    proc=    .00%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
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   **************************************************

   CGSYS Algorithm.    Elastic-Plastic Torsion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 16, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
1000000   1111     0   2253    30     78744 -.4393016840038E+00  .6698777810629E-04
-------------------------------------------------------------------------------
TOTAL   1111     0   2253    30    787.44 (seconds)    proc=    .00%
```

2. Pressure Distribution Problem

```
   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   **************************************************

   CGSYS Algorithm.    Pressure Distribution Problem

   CGSYS. Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.            November 20, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
  40000    631     0   1297    34      1584 -.2828929485457E+00  .2447707200105E-04
-------------------------------------------------------------------------------
TOTAL    631     0   1297    34     15.84 (seconds)    proc=    .00%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   **************************************************

   CGSYS Algorithm.    Pressure Distribution Problem

   CGSYS. Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.            November 20, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 160000   1223     0   2480    33     14532 -.2829064007845E+00  .3998978963325E-04
-------------------------------------------------------------------------------
TOTAL   1223     0   2480    33    145.32 (seconds)    proc=    .00%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   **************************************************

   CGSYS Algorithm.    Pressure Distribution Problem

   CGSYS. Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.            November 20, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 360000   1788     0   3604    27     49273 -.2829088994291E+00  .5126567410241E-04
-------------------------------------------------------------------------------
```

```
TOTAL   1788     0   3604    27    492.73 (seconds)    proc=    .00%

   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Pressure Distribution Problem

   CGSYS. Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.            November 20, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 640000   2357     0   4743    28    118655 -.2829097697609E+00  .6026858315364E-04
-------------------------------------------------------------------------------
TOTAL   2357     0   4743    28   1186.55 (seconds)    proc=    .00%

   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Pressure Distribution Problem

   CGSYS. Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.            November 20, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
1000000   2833     0   5694    27    220395 -.2829101117330E+00  .8163468236980E-04
-------------------------------------------------------------------------------
TOTAL   2833     0   5694    27   2203.95 (seconds)    proc=    .00%
```

3. Optimal Design with Composite Materials

```
   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Optimal Design with Composite Materials

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 23, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
  40000   1042     0   2117    32      4541 -.1138129034543E-01  .3595090856404E-04
-------------------------------------------------------------------------------
TOTAL   1042     0   2117    32     45.41 (seconds)    proc=    .00%

   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Optimal Design with Composite Materials

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 23, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 160000   1930     0   3901    40     36306 -.1138240469527E-01  .6365844052851E-04
-------------------------------------------------------------------------------
TOTAL   1930     0   3901    40    363.06 (seconds)    proc=    .00%

   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Optimal Design with Composite Materials
```

```
   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 23, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 360000   2825     0   5689    38    121100 -.1138251184628E-01  .7862105855397E-04
-------------------------------------------------------------------------------
TOTAL   2825     0   5689    38   1211.00 (seconds)    proc=    .00%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Optimal Design with Composite Materials

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 23, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 640000   3696     0   7436    43    283215 -.1138232833349E-01  .1213001637560E-03
-------------------------------------------------------------------------------
TOTAL   3696     0   7436    43   2832.15 (seconds)    proc=    .00%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Optimal Design with Composite Materials

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 23, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
1000000   4650     0   9346    45    556246 -.1138216439468E-01  .1339168511599E-03
-------------------------------------------------------------------------------
TOTAL   4650     0   9346    45   5562.46 (seconds)    proc=    .00%
```

4. Steady State Combustion Problem

```
   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.     Steady State Combustion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
  40000    299     0    632    33      1932 -.5611448493596E+01  .2374435631776E-04
-------------------------------------------------------------------------------
TOTAL    299     0    632    33     19.32 (seconds)    proc=    .00%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.     Steady State Combustion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 160000    585     0   1200    29     15433 -.5611479470976E+01  .2906016250881E-04
-------------------------------------------------------------------------------
TOTAL    585     0   1200    29    154.33 (seconds)    proc=    .00%
```

```
   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.     Steady State Combustion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 360000    863     0   1759    32     51897 -.5611485235586E+01  .3388100209775E-04
-------------------------------------------------------------------------------
TOTAL    863     0   1759    32    518.97 (seconds)    proc=    .00%

   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.     Steady State Combustion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 640000   1134     0   2304    35    124588 -.5611487252906E+01  .3908395047395E-04
-------------------------------------------------------------------------------
TOTAL   1134     0   2304    35   1245.88 (seconds)    proc=    .00%

   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.     Steady State Combustion Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
1000000   1413     0   2864    37    235711 -.5611488188409E+01  .4244605414911E-04
-------------------------------------------------------------------------------
TOTAL   1413     0   2864    37   2357.11 (seconds)    proc=    .00%
```

5. Minimal Surface Area Problem

```
   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Minimal Surface Area Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
  40000    273     0    567    20      1056  .1000000005620E+01  .4063164865703E-04
-------------------------------------------------------------------------------
TOTAL    273     0    567    20     10.56 (seconds)    proc=    .00%

   **** CGSYS ****                    Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Minimal Surface Area Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
```

```
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 160000    520     0   1062    21      8611  .1000000038175E+01  .6421946187991E-04
-------------------------------------------------------------------------------
TOTAL    520     0   1062    21     86.11 (seconds)    proc=    .00%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Minimal Surface Area Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 360000    789     1   1598    19     29857  .1000000076970E+01  .8845412617607E-04
-------------------------------------------------------------------------------
TOTAL    789     1   1598    19    298.57 (seconds)    proc=    .13%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Minimal Surface Area Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 640000   1126     1   2290    37     77068  .1000000091603E+01  .8010766502728E-04
-------------------------------------------------------------------------------
TOTAL   1126     1   2290    37    770.68 (seconds)    proc=    .09%

   **** CGSYS ****                   Neculai Andrei *
   * Accelerated Conjugate Gradient with Guaranteed *
   * Descent and Conjugacy conditions               *
   ***************************************************

   CGSYS Algorithm.    Minimal Surface Area Problem

   Parameters: t=  .8750000000000E+00    u=  .5000000000000E+00
   CGSYS. Powell restart.           November 24, 2009
-------------------------------------------------------------------------------
      n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
1000000   1399     0   2844    45    149027  .1000000173042E+01  .9553375914302E-04
-------------------------------------------------------------------------------
TOTAL   1399     0   2844    45   1490.27 (seconds)    proc=    .00%
```

November 24, 2009