Computational experience with CG_DESCENT for solving some MINPACK2 applications with 10^6 variables

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1. Elastic-Plastic Torsion Problem

```
CG-DESCENT, standard Wolfe line search, January 19, 2009

      1    CG_DESCENT Algorithm:    Elastic-Plastic Torsion           Function

     n      iter    nfunc    ngrad  time(c)          f                  gnorm
 ------------------------------------------------------------------------------------
 1000000     1145     2291     1147   108783   -.4393012991437E+00  .9703406971102E-06
 ------------------------------------------------------------------------------------
  TOTAL         1145     2291     1147  1087.83(seconds)
```

2. Pressure Distribution Problem

```
 CG-DESCENT, standard Wolfe line search, January 19, 2009

      1    CG_DESCENT Algorithm:    Pressure Distribution in a Journal Function

     n     iter    nfunc    ngrad  time(c)              f                  gnorm
 ------------------------------------------------------------------------------------
1000000     3368     6737     3369   336977    -.2829101441860E+00 .9571140068903E-06
 ------------------------------------------------------------------------------------
  TOTAL         3368     6737     3369  3369.77(seconds)
```

3. Optimal Design with Composite Materials

```
 CG-DESCENT, standard Wolfe line search,January 19, 2009

      1    CG_DESCENT Algorithm:    Optimal Design with Composite MaterFunction

     n     iter    nfunc    ngrad  time(c)              f                  gnorm
 ------------------------------------------------------------------------------------
1000000     4841     9684     4843   805866   -.1138220375091E-01  .9988011843742E-06
 ------------------------------------------------------------------------------------
  TOTAL         4841     9684     4843  8058.66(seconds)
```

5. Steady State Combustion

```
 CG-DESCENT, standard Wolfe line search, January 19, 2009

       1    CG_DESCENT Algorithm:    Steady State Combustion           Function

      n     iter    nfunc    ngrad  time(c)              f                  gnorm
 -------------------------------------------------------------------------------------
1000000     1806     3613     1807   421300   -.5611488039275E+01  .9690689195721E-06
 -------------------------------------------------------------------------------------
  TOTAL         1806     3613     1807  4213.00(seconds)
```

7. Minimal Surface Area

```
 CG-DESCENT, standard Wolfe line search, January 19, 2009

       1    CG_DESCENT Algorithm:    Minimal Surface Area              Function

      n     iter    nfunc    ngrad  time(c)              f                  gnorm
 -------------------------------------------------------------------------------------
1000000     1226     2453     1227   177395   .1000000259829E+01    9405265186902E-06
 -------------------------------------------------------------------------------------
 TOTAL         1226     2453     1227  1773.95(seconds)
```

January 19, 2009