Elastic-Plastic Torsion Problem solved by SCALCG

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In this work I present the results of SCALCG package for solving the Elastic Plastic Torsion problem from MINPACK-2 Collection. In this experiments I considered:

$$nx = 200, \qquad c = 5.$$
$$ny = 200, \qquad \theta^s = .true. \text{ (spectral)}$$

I considered the following stopping criteria:

Stopping criterion	Algebraic expression
1	$\|\nabla f(x_k)\|_\infty \le \varepsilon_g$ or $\|\alpha_k \nabla f(x_k)^T d_k\| \le \varepsilon_f \|f(x_{k+1})\|$
2	$\|\nabla f(x_k)\|_\infty \le \max\{\varepsilon_g, \varepsilon_f \|\nabla f(x_0)\|_\infty\}$
3	$\|\nabla f(x_k)\|_2 \le \varepsilon_g$
4	$\|\nabla f(x_k)\|_2 \le \varepsilon_g \max\{1, \|f(x_{k+1})\|\}$

where

$$\varepsilon_f = 10^{-20} \text{ and } \varepsilon_g = 10^{-6}.$$

The results are as follows:

```
 ELASTIC-PLASTIC Problem   December 4, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 1
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------
theta spectral
 40000    389    167     501    110    7997  -.4392677030965E+00   .5347904467391E-04
-------------------------------------------------------------------------------
TOTAL     389    167     501    110   79.97(seconds)     proc= 42.93%


SCALCG: istop (f)  total =      0    istop (g)  total =      1
        istop (fg) total =      0    istop (fr) total =      0
```

```
 ELASTIC-PLASTIC Problem   December 4, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 2
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------
theta spectral
 40000    389    167     501    110    7991  -.4392677030965E+00   .5347904467391E-04
-------------------------------------------------------------------------------
TOTAL     389    167     501    110   79.91(seconds)     proc= 42.93%
```

```
 ELASTIC-PLASTIC Problem   December 4, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 3
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------------
theta spectral
 40000    783    347    1018    233   16313  -.4392678210702E+00   .8506251023689E-06
-------------------------------------------------------------------------------------
TOTAL     783    347    1018    233  163.13(seconds)     proc= 44.32%
```

```
 ELASTIC-PLASTIC Problem   December 4, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 4
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------------
theta spectral
 40000    783    347    1018    233   16308  -.4392678210702E+00   .8506251023689E-06
-------------------------------------------------------------------------------------
TOTAL     783    347    1018    233  163.08(seconds)     proc= 44.32%
```

December 4, 2006