Steady state combustion 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:

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

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:

```
 Steady state combustion Problem   December 5, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 1
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------
theta spectral
 40000    664    319     853    187   26178  -.5611448111904E+01   .4890782347883E-04
-------------------------------------------------------------------------------
TOTAL     664    319     853    187  261.78(seconds)     proc= 48.04%


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



 Steady state combustion Problem   December 5, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 2
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------
theta spectral
 40000    664    319     853    187   26183  -.5611448111904E+01   .4890782347883E-04
-------------------------------------------------------------------------------
TOTAL     664    319     853    187  261.83(seconds)     proc= 48.04%
```

```
 Steady state combustion Problem   December 5, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 3
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------
theta spectral
 40000   1161    548    1509    346   46324  -.5611448511740E+01   .9183811138680E-06
-------------------------------------------------------------------------------
TOTAL    1161    548    1509    346  463.24(seconds)     proc= 47.20%
```

```
 Steady state combustion Problem   December 5, 2006, *** SCALCG Package ***
Powell criterion for restart.   Stoptest = 4
     n   iter    irs   fgcnt  lscnt   time(c)       fxnew                gnorm
-------------------------------------------------------------------------------
theta spectral
 40000    978    458    1263    283   38783  -.5611448508166E+01   .4678033919670E-05
-------------------------------------------------------------------------------
TOTAL     978    458    1263    283  387.83(seconds)     proc= 46.83%
```

December 6, 2006