Elastic-Plastic Torsion Problem

25 Conjugate Gradient Algorithms
Comparison between conjugate gradient algorithms and their accelerated variants

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1. Conjugate Gradient Algorithms

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   *-----------------------------------------------------
   | Fastest Conjugate Gradient Algorithm Project
   |                                      April 1, 2009
   | stoptest =     1
   | maxiter  = 10000
   | Conjugate Gradient with Powell restart.
   *-----------------------------------------------------

     1    CG-HS Algorithm. Function:Elastic-Plastic Torsion Problem
          Hestenes and Stiefel.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    368    97    582   213       715 -.4392668610228E+00  .5436589407442E-04
-------------------------------------------------------------------------------
TOTAL     368    97    582   213      7.15 (seconds)    proc=  26.36%


     2    CG-FR Algorithm. Function:Elastic-Plastic Torsion Problem
          Fletcher and Reeves.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    407   118    633   225       753 -.4392655894982E+00  .6693023574976E-04
-------------------------------------------------------------------------------
TOTAL     407   118    633   225      7.53 (seconds)    proc=  28.99%


     3    CG-PRP Algorithm. Function:Elastic-Plastic Torsion Problem
          Polak-Ribiere and Polyak.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    388   118    615   226       731 -.4392661058352E+00  .5025911855389E-04
-------------------------------------------------------------------------------
TOTAL     388   118    615   226      7.31 (seconds)    proc=  30.41%


     4    CG-PRP+ Algorithm. Function:Elastic-Plastic Torsion Problem
          Polak-Ribiere and Polyak plus.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    388   118    615   226       732 -.4392661058352E+00  .5025911855389E-04
-------------------------------------------------------------------------------
TOTAL     388   118    615   226      7.32 (seconds)    proc=  30.41%
```

```
     5    CG-CD Algorithm. Function:Elastic-Plastic Torsion Problem
          Conjugate Descent - Fletcher. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    442   135    689   246       811 -.4392660177220E+00  .6894213365544E-04
-------------------------------------------------------------------------------
TOTAL     442   135    689   246      8.11 (seconds)    proc=  30.54%


     6    CG-LS Algorithm. Function:Elastic-Plastic Torsion Problem
          Liu and Storey.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    441   124    704   262       841 -.4392667629587E+00  .5686798908306E-04
-------------------------------------------------------------------------------
TOTAL     441   124    704   262      8.41 (seconds)    proc=  28.12%


     7    CG-DY Algorithm. Function:Elastic-Plastic Torsion Problem
          Dai and Yuan.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    396   103    615   218       735 -.4392668806583E+00  .5539177164620E-04
-------------------------------------------------------------------------------
TOTAL     396   103    615   218      7.35 (seconds)    proc=  26.01%


     8    CG-DL Algorithm. Function:Elastic-Plastic Torsion Problem
          Dai and Liao (t=1).  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    406   110    620   213       738 -.4392677432931E+00  .4643440652585E-04
-------------------------------------------------------------------------------
TOTAL     406   110    620   213      7.38 (seconds)    proc=  27.09%


     9    CG-DL+ Algorithm. Function:Elastic-Plastic Torsion Problem
          Dai and Liao plus (t=1).  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    435   121    679   243       810 -.4392659416678E+00  .6802904252760E-04
-------------------------------------------------------------------------------
TOTAL     435   121    679   243      8.10 (seconds)    proc=  27.82%


    10    CG-SDC Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei - Sufficient Descent Condition.  stoptest= 1
    aCGSD: beta = gtg/yts - ytg*stg/(yts*yts)
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000  10001  9934  10046    45     12893 -.4343571798784E+00  .9029803144368E-02
-------------------------------------------------------------------------------
TOTAL   10001  9934  10046    45    128.93 (seconds)    proc=  99.33%


    11    CG-hDY Algorithm. Function:Elastic-Plastic Torsion Problem
          hDY:Hybrid Dai and Yuan. max(c*DY,min(HS,DY)). stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    441   128    704   262       838 -.4392666064706E+00  .6071848374273E-04
-------------------------------------------------------------------------------
TOTAL     441   128    704   262      8.38 (seconds)    proc=  29.02%


    12    CG-hDYz Algorithm. Function:Elastic-Plastic Torsion Problem
          hDYz: Hybrid Dai and Yuan zero. max(0,min(HS,DY)). stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
```

```
 40000    441   128    704   262       842 -.4392666064706E+00  .6071848374273E-04
-------------------------------------------------------------------------------------
TOTAL     441   128    704   262      8.42 (seconds)    proc=  29.02%


    13    CG-GN Algorithm. Function:Elastic-Plastic Torsion Problem
          Gilbert and Nocedal.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    360   118    567   206       674 -.4392653353816E+00  .6340222266705E-04
-------------------------------------------------------------------------------------
TOTAL     360   118    567   206      6.74 (seconds)    proc=  32.78%


    14    CG-HuS Algorithm. Function:Elastic-Plastic Torsion Problem
          PRP-FR: Hu and Storey. max(0,min(PRP,FR)). stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    360   118    567   206       672 -.4392653353816E+00  .6340222266705E-04
-------------------------------------------------------------------------------------
TOTAL     360   118    567   206      6.72 (seconds)    proc=  32.78%


    15    CG-TAS Algorithm. Function:Elastic-Plastic Torsion Problem
          Touat-Ahmed and Storey. (PRP <= FR). stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    360   118    567   206       675 -.4392653353816E+00  .6340222266705E-04
-------------------------------------------------------------------------------------
TOTAL     360   118    567   206      6.75 (seconds)    proc=  32.78%


    16    LS-CD Algorithm. Function:Elastic-Plastic Torsion Problem
          Hybrid Liu&Storey-Conjugate Descent. max(0,min(LS,CD)) stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    461   128    735   273       875 -.4392657108720E+00  .6453101786929E-04
-------------------------------------------------------------------------------------
TOTAL     461   128    735   273      8.75 (seconds)    proc=  27.77%


    17    CG-BM Algorithm. Function:Elastic-Plastic Torsion Problem
          Birgin and Martinez (scaled Perry). Theta spectral. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    393   114    607   213       727 -.4392662851099E+00  .6548988353399E-04
-------------------------------------------------------------------------------------
TOTAL     393   114    607   213      7.27 (seconds)    proc=  29.01%


    18    CG-BM+ Algorithm. Function:Elastic-Plastic Torsion Problem
          Birgin and Martinez plus (scaled Perry). Theta spectral. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    369   100    573   203       686 -.4392667077490E+00  .6669242382365E-04
-------------------------------------------------------------------------------------
TOTAL     369   100    573   203      6.86 (seconds)    proc=  27.10%


    19    CG-sPRP Algorithm. Function:Elastic-Plastic Torsion Problem
          Scaled Polak-Ribiere and Polyak. Theta spectral. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    413   116    663   249       793 -.4392663680385E+00  .6193243390135E-04
-------------------------------------------------------------------------------------
TOTAL     413   116    663   249      7.93 (seconds)    proc=  28.09%


    20    CG-sFR Algorithm. Function:Elastic-Plastic Torsion Problem
          Scaled Fletcher and Revees. Theta spectral. stoptest= 1
```

```
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
--------------------------------------------------------------------------------
 40000    467   138    738   270       883 -.4392664993328E+00  .5341923652523E-04
--------------------------------------------------------------------------------
TOTAL     467   138    738   270      8.83 (seconds)    proc=  29.55%


    21    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei New Sufficient Descent from PRP. stoptest= 1
    PRP-SDC: beta = (ytg-yty*stg/gtgprev)/yts
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
--------------------------------------------------------------------------------
 40000    435   127    696   260       838 -.4392664453296E+00  .5306522750304E-04
--------------------------------------------------------------------------------
TOTAL     435   127    696   260      8.38 (seconds)    proc=  29.20%


    22    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei New Sufficient Descent from DY. stoptest= 1
          ACGSD: beta=ytg/yts-ytg*stg/(yts**2)

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
--------------------------------------------------------------------------------
 40000    376    99    578   201       694 -.4392673575219E+00  .4909018905049E-04
--------------------------------------------------------------------------------
TOTAL     376    99    578   201      6.94 (seconds)    proc=  26.33%


    23    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei Sufficient Descent from DY (max). stoptest= 1
          ACGSDz: beta=max(0,ytg/yts)*(1-stg/yts)

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
--------------------------------------------------------------------------------
 40000    360    99    561   200       669 -.4392676068443E+00  .6107996580066E-04
--------------------------------------------------------------------------------
TOTAL     360    99    561   200      6.69 (seconds)    proc=  27.50%


    24    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          PRP - DY with Newton direction. (NDOMB) stoptest= 1
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
--------------------------------------------------------------------------------
 40000    406   114    627   220       749 -.4392656198067E+00  .6655180118190E-04
--------------------------------------------------------------------------------
TOTAL     406   114    627   220      7.49 (seconds)    proc=  28.08%


    25    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          PRP - DY with Conjugacy Condition. (CCOMB) stoptest= 1
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
--------------------------------------------------------------------------------
 40000    403   115    628   224       753 -.4392676684103E+00  .5504297139146E-04
--------------------------------------------------------------------------------
TOTAL     403   115    628   224      7.53 (seconds)    proc=  28.54%
```

2. Accelerated Conjugate Gradient Algorithms

```
*-----------------------------------------------------
| Fastest Conjugate Gradient Algorithm Project
|                                        April 1, 2009
| stoptest =     1
| maxiter  = 10000
| Accelerated Conjugate Gradient with Powell restart.
*-----------------------------------------------------

  1    CG-HS Algorithm. Function:Elastic-Plastic Torsion Problem
       Hestenes and Stiefel.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       609 -.4392678188055E+00  .3175820769772E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      6.09 (seconds)    proc=    .00%


  2    CG-FR Algorithm. Function:Elastic-Plastic Torsion Problem
       Fletcher and Reeves.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       597 -.4392678188055E+00  .3175915504546E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.97 (seconds)    proc=    .00%


  3    CG-PRP Algorithm. Function:Elastic-Plastic Torsion Problem
       Polak-Ribiere and Polyak.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       592 -.4392678188056E+00  .3175864821436E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.92 (seconds)    proc=    .00%


  4    CG-PRP+ Algorithm. Function:Elastic-Plastic Torsion Problem
       Polak-Ribiere and Polyak plus.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       588 -.4392678188056E+00  .3175864821436E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.88 (seconds)    proc=    .00%


  5    CG-CD Algorithm. Function:Elastic-Plastic Torsion Problem
       Conjugate Descent - Fletcher. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       582 -.4392678188045E+00  .3180171595878E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.82 (seconds)    proc=    .00%


  6    CG-LS Algorithm. Function:Elastic-Plastic Torsion Problem
       Liu and Storey.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       588 -.4392678188055E+00  .3175850148118E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.88 (seconds)    proc=    .00%


  7    CG-DY Algorithm. Function:Elastic-Plastic Torsion Problem
       Dai and Yuan.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
```

```
 40000    241     0    510    27       596 -.4392678188043E+00  .3180653373005E-04
-------------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.96 (seconds)    proc=    .00%


     8    CG-DL Algorithm. Function:Elastic-Plastic Torsion Problem
          Dai and Liao (t=1).  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    241     0    510    27       593 -.4392678188055E+00  .3175800592310E-04
-------------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.93 (seconds)    proc=    .00%


     9    CG-DL+ Algorithm. Function:Elastic-Plastic Torsion Problem
          Dai and Liao plus (t=1).  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    241     0    510    27       592 -.4392678188055E+00  .3175904049287E-04
-------------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.92 (seconds)    proc=    .00%


    10    CG-SDC Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei - Sufficient Descent Condition.  stoptest= 1
    aCGSD: beta = gtg/yts - ytg*stg/(yts*yts)
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    241     0    510    27       591 -.4392678188056E+00  .3175752837159E-04
-------------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.91 (seconds)    proc=    .00%


    11    CG-hDY Algorithm. Function:Elastic-Plastic Torsion Problem
          hDY:Hybrid Dai and Yuan. max(c*DY,min(HS,DY)). stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    428    83   1092   235      1271 -.4392672102975E+00  .4043265483200E-04
-------------------------------------------------------------------------------------
TOTAL     428    83   1092   235     12.71 (seconds)    proc=  19.39%


    12    CG-hDYz Algorithm. Function:Elastic-Plastic Torsion Problem
          hDYz: Hybrid Dai and Yuan zero. max(0,min(HS,DY)). stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    428    83   1092   235      1270 -.4392672102975E+00  .4043265483200E-04
-------------------------------------------------------------------------------------
TOTAL     428    83   1092   235     12.70 (seconds)    proc=  19.39%


    13    CG-GN Algorithm. Function:Elastic-Plastic Torsion Problem
          Gilbert and Nocedal.  stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    241     0    510    27       588 -.4392678188054E+00  .3176498414142E-04
-------------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.88 (seconds)    proc=    .00%


    14    CG-HuS Algorithm. Function:Elastic-Plastic Torsion Problem
          PRP-FR: Hu and Storey. max(0,min(PRP,FR)). stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------------
 40000    241     0    510    27       590 -.4392678188054E+00  .3176498414142E-04
-------------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.90 (seconds)    proc=    .00%


    15    CG-TAS Algorithm. Function:Elastic-Plastic Torsion Problem
          Touat-Ahmed and Storey. (PRP <= FR). stoptest= 1
```

```
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       588 -.4392678188054E+00  .3176498414142E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.88 (seconds)    proc=    .00%


    16    LS-CD Algorithm. Function:Elastic-Plastic Torsion Problem
          Hybrid Liu&Storey-Conjugate Descent. max(0,min(LS,CD)) stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       591 -.4392678188056E+00  .3175812838347E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.91 (seconds)    proc=    .00%


    17    CG-BM Algorithm. Function:Elastic-Plastic Torsion Problem
          Birgin and Martinez (scaled Perry). Theta spectral. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       593 -.4392678188056E+00  .3175774391693E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.93 (seconds)    proc=    .00%


    18    CG-BM+ Algorithm. Function:Elastic-Plastic Torsion Problem
          Birgin and Martinez plus (scaled Perry). Theta spectral. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       594 -.4392678188055E+00  .3175819224527E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.94 (seconds)    proc=    .00%


    19    CG-sPRP Algorithm. Function:Elastic-Plastic Torsion Problem
          Scaled Polak-Ribiere and Polyak. Theta spectral. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    423    83   1071   224      1247 -.4392659302976E+00  .6410421638038E-04
-------------------------------------------------------------------------------
TOTAL     423    83   1071   224     12.47 (seconds)    proc=  19.62%


    20    CG-sFR Algorithm. Function:Elastic-Plastic Torsion Problem
          Scaled Fletcher and Revees. Theta spectral. stoptest= 1

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    469   106   1184   245      1384 -.4392675687609E+00  .6679284527663E-04
-------------------------------------------------------------------------------
TOTAL     469   106   1184   245     13.84 (seconds)    proc=  22.60%


    21    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei New Sufficient Descent from PRP. stoptest= 1
    PRP-SDC: beta = (ytg-yty*stg/gtgprev)/yts
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    463    87   1202   275      1400 -.4392677974666E+00  .3766831541914E-04
-------------------------------------------------------------------------------
TOTAL     463    87   1202   275     14.00 (seconds)    proc=  18.79%


    22    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei New Sufficient Descent from DY. stoptest= 1
          ACGSD: beta=ytg/yts-ytg*stg/(yts**2)

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       594 -.4392678188056E+00  .3175789503236E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.94 (seconds)    proc=    .00%
```

```
    23    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          Andrei Sufficient Descent from DY (max). stoptest= 1
          ACGSDz: beta=max(0,ytg/yts)*(1-stg/yts)

     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       594 -.4392678188056E+00  .3175762053098E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.94 (seconds)    proc=    .00%


    24    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          PRP - DY with Newton direction. (NDOMB) stoptest= 1
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       591 -.4392678188056E+00  .3175782091383E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.91 (seconds)    proc=    .00%


    25    New CG Algorithm. Function:Elastic-Plastic Torsion Problem
          PRP - DY with Conjugacy Condition. (CCOMB) stoptest= 1
     n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm
-------------------------------------------------------------------------------
 40000    241     0    510    27       591 -.4392678188056E+00  .3175802064054E-04
-------------------------------------------------------------------------------
TOTAL     241     0    510    27      5.91 (seconds)    proc=    .00%
```

Remarks.

This problem belongs to the MINPACK2 collection.

These results have been obtained with APPL1.FOR package which implements 25 conjugate gradient algorithms in classical and accelerated versions. To use the accelerated version of these algorithms the value of the logical parameter accel must be set to .true.

Observe the differences between cpu time corresponding to the conjugate gradient algorithms and their accelerated versions.

References

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