Numerical Results for Polak-Ribière (PR)

Powell restart, 750 problems

Stopping criterion: $\left\|\nabla f(x_k)\right\|_\infty \le 10^{-6}$.

CG with Powell restart. May 3, 2006

1 *** CG Algorithm ***. Function:FREUROTH (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	15	9	32	15	9	.2449212683962E+05	.1525267515042E-04
2000	16	10	35	16	19	.4898425367924E+05	.5880478790258E-07
3000	14	9	31	14	8	.7347638051886E+05	.1575431797214E-04
4000	20	12	45	20	16	.9796850735848E+05	.4166214271591E-04
5000	18	10	39	18	17	.1224606341981E+06	.6235722368818E-06
6000	15	9	41	15	20	.1469527610377E+06	.1825044144994E-05
7000	15	9	41	15	24	.1714448878773E+06	.6768772986904E-06
8000	15	9	41	15	26	.1959370147169E+06	.2927839912394E-06
9000	17	11	44	17	32	.2204291415566E+06	.3098653734320E-04
10000	15	9	41	15	33	.2449212683962E+06	.6203385906270E-06
TOTAL	160	97	390	160	2.04 (seconds)	proc= 60.63%	

2 *** CG Algorithm ***. Function:Extended Trigonometric

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	29	19	51	17	9	.1660874484367E-09	.7976969020227E-05
2000	37	25	62	21	20	.1258799454761E-09	.5300035935160E-05
3000	29	19	53	20	25	.4697329996719E-12	.1267019126317E-05
4000	30	22	55	21	34	.3673025320926E-11	.2459368040480E-05
5000	30	23	55	21	43	.6850670355241E-12	.1397106881166E-05
6000	34	24	56	19	54	.3099589638207E-08	.5566257358177E-05
7000	29	21	52	20	57	.7131800181632E-09	.1693382724580E-04
8000	35	23	61	23	77	.1573999903158E-11	.9159532472551E-06
9000	38	27	69	27	98	.9855524196840E-12	.1753878734512E-05
10000	35	26	60	22	96	.7555319146435E-13	.4669412103211E-06
TOTAL	326	229	574	211	5.13 (seconds)	proc= 70.25%	

3 *** CG Algorithm ***. Function:SROSENBR (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	39	21	84	34	9	.7630181842169E-14	.3909442844482E-05
2000	40	20	86	34	18	.1466172820809E-11	.1082546326379E-05
3000	35	19	75	27	25	.2063468445585E-08	.4060513163737E-04
4000	34	19	80	28	32	.2695084041699E-19	.9478229811814E-09
5000	37	17	89	32	46	.2523658826494E-13	.1419753882623E-06
6000	34	16	77	28	48	.3235371676277E-16	.5083467177751E-08
7000	40	20	88	33	65	.4330670692988E-13	.1859844681173E-06
8000	40	21	92	35	77	.2770618516149E-19	.1488091164027E-09
9000	31	16	72	24	68	.1567433678570E-14	.1452556296122E-05
10000	32	18	75	26	78	.3036965580225E-10	.4944712054860E-05
TOTAL	362	187	818	301	4.66 (seconds)	proc= 51.66%	

4 *** CG Algorithm ***. Function:Extended White & Holst

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	34	19	74	29	8	.2484935544827E-11	.9970425140239E-06
2000	30	16	60	23	14	.2997090827987E-12	.9374521160759E-05
3000	32	15	67	25	22	.2182439992715E-08	.3080150286160E-04
4000	33	17	73	28	31	.3678311420128E-10	.3834065219771E-05
5000	35	18	75	29	41	.1201732661926E-08	.2327490785556E-04
6000	34	18	73	28	47	.6964826404769E-09	.4507026448488E-04
7000	35	18	75	29	57	.3310876838224E-08	.3818750908181E-04

8000	35	18	75	29	65	.3184727790736E-08	.3754717015559E-04
9000	35	18	75	29	74	.3462510491453E-08	.3917125596378E-04
10000	34	18	73	28	79	.1874799169151E-08	.7874161607185E-04
TOTAL	337	175	720	277	4.38 (seconds)	proc= 51.93%	

5 *** CG Algorithm ***. Function:Extended Beale BEALE (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	12	7	25	11	2	.1935887822677E-09	.1080431361028E-04
2000	12	8	25	11	4	.1234094049495E-08	.2727946300957E-04
3000	14	9	28	12	6	.1470141762258E-09	.1740175786441E-04
4000	14	9	28	12	8	.2277413655306E-09	.2260169445465E-04
5000	14	9	28	12	11	.3136144303945E-09	.2738023013161E-04
6000	14	9	28	12	12	.4025569201445E-09	.3180231325921E-04
7000	14	9	28	12	15	.4941956793268E-09	.3595050979923E-04
8000	14	9	28	12	16	.5873949632748E-09	.3985210043369E-04
9000	14	9	28	12	19	.6821645509440E-09	.4355540232185E-04
10000	14	9	28	12	23	.7787525232808E-09	.4710118115851E-04
TOTAL	136	87	274	118	1.16 (seconds)	proc= 63.97%	

6 *** CG Algorithm ***. Function:Extended Penalty

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	19	11	43	12	4	.8831940750670E+03	.1257962814258E-04
2000	9	5	31	9	5	.1814063664869E+04	.1685439690093E-05
3000	10	7	33	9	8	.2755973749503E+04	.2038585571884E-05
4000	20	17	44	17	18	.3704070534948E+04	.8215593388822E-06
5000	10	7	34	9	13	.4656333923744E+04	.5019815003013E-05
6000	17	14	45	17	24	.5611676659140E+04	.8844882270500E-06
7000	19	17	49	18	31	.6569428560737E+04	.7826559171293E-07
8000	9	6	34	9	21	.7529139638522E+04	.3994225036997E-06
9000	18	14	48	16	39	.8490489281459E+04	.1655269384699E-05
10000	84	81	2390	83	1422	.9453238852842E+04	.9981713056625E-06
TOTAL	215	179	2751	199	15.85 (seconds)	proc= 83.26%	

7 *** CG Algorithm ***. Function:Perturbed Quadratic

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	334	102	517	182	45	.1881134421145E-12	.3044854239316E-05
2000	439	138	693	253	120	.2810075711400E-12	.3368837878708E-05
3000	504	150	808	303	207	.4933637317872E-13	.3562749032896E-05
4000	803	236	1285	481	442	.1279375590236E-12	.3045190627338E-05
5000	889	265	1411	521	608	.3862551940168E-13	.5337043385407E-05
6000	783	248	1238	454	638	.2405338603545E-12	.2841007607166E-05
7000	1034	320	1643	608	990	.1345577609966E-12	.4976743303984E-05
8000	967	285	1539	571	1059	.1281844865042E-12	.5142874066072E-05
9000	1141	337	1817	675	1405	.4490280812468E-14	.3562029043801E-05
10000	1135	343	1801	665	1551	.2041473037925E-12	.6699657645691E-05
TOTAL	8029	2424	12752	4713	70.65 (seconds)	proc= 30.19%	

8 *** CG Algorithm ***. Function:Raydan 1

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	2001	1861	2126	122	218	.5005000000001E+05	.4173200715126E-03
2000	2001	1829	2155	153	446	.2001000000018E+06	.3674971320346E-02
3000	2001	1755	2238	233	669	.4501500000005E+06	.2812185904639E-02
4000	1384	957	2204	584	638	.8002000000000E+06	.1002642462136E-05
5000	2001	1608	2643	510	981	.1250250000000E+07	.1158385020039E-04
6000	2001	1655	2309	303	1375	.1800300000007E+07	.9250529136682E-02
7000	2001	1684	2297	289	1587	.2450350000014E+07	.1747096970152E-01
8000	2001	1619	2427	405	1698	.3200400000000E+07	.2401231871786E-02

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 9000   2001  1685   2282   275      2045  .4050450000079E+07  .3529052087384E-01
10000   2001  1786   2179   176      2230  .5000500000164E+07  .7917557607150E-01
-------------------------------------------------------------------------------
TOTAL  19393 16439  22860  3050    118.87 (seconds)    proc= 84.77%


  9  *** CG Algorithm ***. Function:Raydan 2

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      4     4      9     4         1  .1000000000000E+04  .1635064765115E-06
 2000      4     4      9     4         1  .2000000000000E+04  .2278906631831E-06
 3000      4     4      9     4         2  .3000000000000E+04  .2772825628631E-06
 4000      4     4      9     4         3  .4000000000000E+04  .3189153148706E-06
 5000      4     4      9     4         3  .5000000000000E+04  .3555877116125E-06
 6000      4     4      9     4         4  .6000000000000E+04  .3887512483346E-06
 7000      4     4      9     4         5  .7000000000000E+04  .4192396809906E-06
 8000      4     4      9     4         5  .8000000000000E+04  .4476367480985E-06
 9000      4     4      9     4         6  .9000000000000E+04  .4742706205552E-06
10000      4     4      9     4         7  .1000000000000E+05  .4994223985213E-06
-------------------------------------------------------------------------------
TOTAL     40    40     90    40       .37 (seconds)    proc= 100.00%


 10  *** CG Algorithm ***. Function:Powell singular (CUTE)

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     58    21    105    46        11  .2362939220177E-06  .1231522754316E-04
 2000     76    27    144    67        30  .1864303301920E-06  .1131629883179E-04
 3000     81    30    152    70        47  .5309083655065E-06  .2766409688847E-04
 4000     62    21    115    52        48  .2234284276066E-06  .8764762665048E-05
 5000     75    28    144    68        74  .1930257116350E-06  .9196147830785E-05
 6000     78    27    149    70        92  .5881144257728E-06  .1767593075533E-04
 7000     61    18    117    55        84  .1303170346419E-05  .4592958874018E-04
 8000     91    32    168    76       140  .8349079447892E-06  .1989789668531E-04
 9000     81    30    152    70       142  .2604354870819E-05  .5155873954488E-04
10000     69    26    128    58       133  .1751175143178E-06  .8009424043188E-05
-------------------------------------------------------------------------------
TOTAL    732   260   1374   632      8.01 (seconds)    proc= 35.52%


 11  *** CG Algorithm ***. Function:Diagonal 1

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     33     9     59    25         7  .2877268733882E-10  .4955943003370E-06
 2000     29     8     51    21        12  .9512859633432E-09  .1101111273739E-05
 3000     34     9     62    27        22  .2359041835349E-09  .1480661705755E-05
 4000     39    10     69    29        33  .8727023326779E-11  .5318603524391E-06
 5000     34     9     60    25        35  .1295399037294E-08  .1336732333942E-05
 6000     34     9     61    26        44  .8373174181309E-09  .1031844329491E-05
 7000     41    11     73    31        61  .6162836173765E-09  .1077281362966E-05
 8000     36    10     63    26        60  .1384924494767E-08  .6786596160813E-06
 9000     34     9     62    27        66  .7147794309099E-09  .1436926361785E-05
10000     35    10     62    26        74  .3419724176465E-09  .1406087690680E-05
-------------------------------------------------------------------------------
TOTAL    349    94    622   263      4.14 (seconds)    proc= 26.93%


 12  *** CG Algorithm ***. Function:Diagonal 2

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      4     4      9     4         1 -.2149394739916E+03  .3758418498031E-07
 2000      4     4      9     4         2 -.4298789479833E+03  .5307646103479E-07
 3000      4     4      9     4         4 -.6448184219749E+03  .6494247758006E-07
 4000      4     4      9     4         5 -.8597578959664E+03  .7493214001985E-07
 5000      4     4      9     4         5 -.1074697369958E+04  .8376321584913E-07
 6000      4     4      9     4         7 -.1289636843950E+04  .9172659933040E-07
 7000      4     4      9     4         9 -.1504576317941E+04  .9906983669916E-07
 8000      4     4      9     4         9 -.1719515791933E+04  .1059012924078E-06
 9000      4     4      9     4        10 -.1934455265925E+04  .1122201791754E-06
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10000      4     4      9     4        12 -.2149394739916E+04  .1183165010410E-06
-------------------------------------------------------------------------------
TOTAL     40    40     90    40       .64 (seconds)    proc= 100.00%


 13  *** CG Algorithm ***. Function:Hager

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000    222   194   5748   206       331 -.4474419132154E+05  .1158984243011E-05
 2000    468   431  13235   441      1486 -.1471735005125E+06  .9991358438665E-06
 3000    743   706  22299   717      3804 -.2925501003138E+06  .1061050691466E-05
 4000   1574  1536  49455  1546     11293 -.4746425076978E+06  .2148493970784E-05
 5000   1732  1691  54507  1704     15426 -.6896067628040E+06  .2006938035877E-05
 6000   1775  1738  56490  1756     19036 -.9347349321991E+06  .1217775405862E-05
 7000   2001  1960  63818  1978     24988 -.1207973806382E+07  .3009545484138E-05
 8000   2001  1969   2031    29      1979 -.1507691037211E+07  .1959581750720E-01
 9000   2001  1952  63661  1966     32131 -.1832544956898E+07  .2931495237922E-04
10000   2001  1959  64507  1975     36338 -.2181405217178E+07  .1441280610718E-04
-------------------------------------------------------------------------------
TOTAL  14518 14136 395751 12318   1468.12 (seconds)    proc= 97.37%


 14  *** CG Algorithm ***. Function:Generalized Tridiagonal 1

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     45    32    601    36        58  .9972103074860E+03  .1182587687018E-05
 2000     21     3     45    19        11  .1997210307486E+04  .1891974618790E-05
 3000     26    11    182    25        56  .2997210307486E+04  .2121636433554E-05
 4000     41    27    462    31       177  .3997210307486E+04  .7398826684272E-06
 5000     36    20    452    35       216  .4997210307486E+04  .1976076311515E-05
 6000     23     9     48    19        37  .5997210307486E+04  .2259030321042E-05
 7000     34    20    417    29       279  .6997210307486E+04  .1984534967398E-05
 8000     23     3     52    22        52  .7997210307486E+04  .2389773204693E-05
 9000     83    69   1911    79      1583  .8997210307486E+04  .1483528162718E-05
10000     21     7     48    20        60  .9997210307486E+04  .2760534392835E-05
-------------------------------------------------------------------------------
TOTAL    353   201   4218   315     25.29 (seconds)    proc= 56.94%


 15  *** CG Algorithm ***. Function:Extended Tridiagonal 1

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     11     6     22    10         3  .1168194263149E-07  .3825034173128E-05
 2000     10     5     21    10         4  .2510580256597E-07  .2006484210161E-05
 3000     10     5     21    10         6  .5135880073370E-07  .3101712357340E-05
 4000     10     5     21    10         8  .7957951866114E-07  .4009610252509E-05
 5000     10     5     21    10        10  .1089900677570E-06  .4802430194697E-05
 6000     10     5     21    10        13  .1392276177570E-06  .5516211281331E-05
 7000     10     5     21    10        14  .1700847100141E-06  .6172196643918E-05
 8000     10     5     21    10        16  .2014288002384E-06  .6784705433052E-05
 9000      9     5     19     9        16  .2338606480226E-06  .7402506720552E-04
10000      9     5     19     9        18  .2657550676067E-06  .6374486445400E-04
-------------------------------------------------------------------------------
TOTAL     99    51    207    98      1.08 (seconds)    proc= 51.52%


 16  *** CG Algorithm ***. Function:Extended Three Expo Terms

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     16     8     25     8         3  .1279633348329E+04  .7918147113527E-05
 2000     14     7     22     7         5  .2559266696658E+04  .3697463734585E-04
 3000     14     7     22     7         8  .3838900044987E+04  .1484933762536E-04
 4000     12     6     19     6         9  .5118533393317E+04  .1463560669317E-04
 5000     12     6     19     6        11  .6398166741646E+04  .3512258320815E-04
 6000     12     6     19     6        13  .7677800089975E+04  .3330254408837E-04
 7000     13     7     21     7        18  .8957433438304E+04  .2993563444971E-04
 8000     12     6     19     6        19  .1023706678663E+05  .6702554088545E-04
 9000     12     6     19     6        21  .1151670013496E+05  .5380302520436E-04
10000     12     6     19     6        23  .1279633348329E+05  .3671504345716E-04
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TOTAL    129    65    204    65      1.30 (seconds)    proc= 50.39%
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17 *** CG Algorithm ***. Function:Generalized Tridiagonal 2

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	53	17	89	34	15	.2221804172145E+01	.2991622213029E-05
2000	55	20	88	30	29	.9584127765254E+00	.2710758070347E-05
3000	51	18	85	31	43	.9584127765254E+00	.3189281541174E-05
4000	64	27	103	36	170	.9584127765254E+00	.1781355328348E-05
5000	60	22	96	33	81	.9584127765254E+00	.1003071648146E-05
6000	68	28	107	36	109	.9584127765254E+00	.2534411202209E-05
7000	58	19	93	32	110	.9584127765254E+00	.2377813198549E-05
8000	61	24	97	33	131	.9584127765254E+00	.2149490632257E-05
9000	57	18	95	35	141	.2852933237635E+01	.2590576645617E-05
10000	58	24	95	34	159	.2852933237635E+01	.2600617462127E-05
TOTAL	585	217	948	334	9.88 (seconds)	proc= 37.09%	

18 *** CG Algorithm ***. Function:Diagonal 4

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	4	2	8	3	0	.9884954697143E-28	.1951893848974E-13
2000	4	2	8	3	1	.3586560042343E-27	.3074377104052E-13
3000	4	2	8	3	2	.3047683020601E-27	.6445319313336E-13
4000	4	2	8	3	3	.1028677494127E-27	.4044035225961E-13
5000	4	2	8	3	3	.4504512949039E-27	.3578515219055E-13
6000	4	2	8	3	3	.1919185717006E-26	.1414711280825E-12
7000	4	2	8	3	5	.1363991390297E-27	.4800427049700E-13
8000	4	2	8	3	4	.1948774046097E-25	.3602967522474E-12
9000	4	2	8	3	6	.2946487986522E-25	.2580332641510E-12
10000	4	2	8	3	5	.3429055776748E-25	.3334016604922E-12
TOTAL	40	20	80	30	.32 (seconds)	proc= 50.00%	

19 *** CG Algorithm ***. Function:Diagonal 5

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	4	4	9	4	1	.2000000000000E+04	.2418891942764E-05
2000	4	4	9	4	2	.4000000000000E+04	.3403563810362E-05
3000	4	4	9	4	3	.6000000000000E+04	.4158921332457E-05
4000	4	4	9	4	4	.8000000000000E+04	.4795590581301E-05
5000	4	4	9	4	5	.1000000000000E+05	.5356575127878E-05
6000	4	4	9	4	6	.1200000000000E+05	.5863654175188E-05
7000	4	4	9	4	7	.1400000000000E+05	.6329724020404E-05
8000	4	4	9	4	7	.1600000000000E+05	.6764167046916E-05
9000	4	4	9	4	10	.1800000000000E+05	.7171363839538E-05
10000	4	4	9	4	10	.2000000000000E+05	.7556982510420E-05
TOTAL	40	40	90	40	.55 (seconds)	proc= 100.00%	

20 *** CG Algorithm ***. Function:HIMMELBC (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	10	6	19	8	1	.2188674176065E-13	.1438517239686E-05
2000	10	6	19	8	3	.5962843500534E-13	.2356209557707E-05
3000	10	6	19	8	4	.1020906568849E-12	.3072738597147E-05
4000	10	6	19	8	6	.1470875088539E-12	.3680957445673E-05
5000	19	10	31	11	12	.2757034410925E-10	.4484350241460E-04
6000	19	10	31	11	16	.3182199627585E-10	.4823715638514E-04
7000	19	10	31	11	17	.3603850832643E-10	.5138358154199E-04
8000	19	10	31	11	20	.4023801027525E-10	.5433727272036E-04
9000	19	10	31	11	23	.4441404986249E-10	.5712432394891E-04
10000	19	10	31	11	25	.4856768196938E-10	.5976868995643E-04

```
TOTAL    154    84    262    98      1.27 (seconds)    proc= 54.55%


 21  *** CG Algorithm ***. Function:Generalized PSC1

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000   2001  1954   2055    51       668  .9987220427508E+03  .1947304244067E-03
 2000    287   190   3749   231      2009  .1998722041868E+04  .1011691887964E-04
 3000    471   284   4986   386      4284  .2998722041844E+04  .8793238018489E-05
 4000   2001  1844  16973   681     17716  .3998722041713E+04  .4636026882047E-04
 5000   2001  1907   2120   110      3614  .4998722044560E+04  .8266461499797E-03
 6000    807   597  13879   724     21875  .5998722041701E+04  .5405524165461E-05
 7000   2001  1843   7450   372     14871  .6998722043555E+04  .2031145871884E-02
 8000    725   553   1797   266      4463  .7998722041729E+04  .5402999431526E-05
 9000    500   382   9347   422     23157  .8998722042840E+04  .1678345731870E-04
10000   2001  1883   2193   138      7317  .9998722056155E+04  .8341426784170E-03
-------------------------------------------------------------------------------
TOTAL  12795 11437  64549  3381    999.74 (seconds)    proc= 89.39%


 22  *** CG Algorithm ***. Function:Extended PSC1

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      6     5     13     6         2  .3865995282465E+03  .5099011441643E-05
 2000      6     5     13     6         6  .7731990564929E+03  .7888043828141E-05
 3000      6     5     13     6         7  .1159798584739E+04  .2516688951112E-04
 4000      7     5     15     7        13  .1546398112986E+04  .6609147740573E-06
 5000      7     5     15     7        15  .1932997641232E+04  .7926933845687E-06
 6000      7     5     15     7        18  .2319597169479E+04  .9182867490645E-06
 7000      7     5     15     7        21  .2706196697725E+04  .1035596703525E-05
 8000      7     5     15     7        23  .3092796225972E+04  .1112637587256E-05
 9000      7     5     15     7        26  .3479395754218E+04  .1213443872231E-05
10000      7     5     15     7        30  .3865995282465E+04  .1265656030357E-05
-------------------------------------------------------------------------------
TOTAL     67    50    144    67      1.61 (seconds)    proc= 74.63%


 23  *** CG Algorithm ***. Function:Extended Powell

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     65    23    119    53        11  .1019352976874E-06  .1513242712582E-04
 2000     73    25    136    62        24  .1979375460187E-06  .9685766922829E-05
 3000     75    22    144    68        39  .1817211258266E-06  .8300453453723E-05
 4000     73    22    141    67        50  .3002583538055E-06  .1810982584134E-04
 5000     57    17    110    52        49  .1248637713965E-05  .3206531853431E-04
 6000     60    20    113    52        61  .1182894948044E-05  .3115540895360E-04
 7000     67    20    124    56        79  .8322917640465E-06  .4986167437338E-04
 8000     65    22    122    56        88  .2216520960842E-05  .4589279436954E-04
 9000     70    23    130    59       106  .2636111468779E-05  .4667436372866E-04
10000     56    19    105    48        96  .1468595196170E-05  .3500677929786E-04
-------------------------------------------------------------------------------
TOTAL    661   213   1244   573      6.03 (seconds)    proc= 32.22%


 24  *** CG Algorithm ***. Function:Extended Block-Diagonal BD1

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     55    55     87    29         8  .8488002777903E-10  .1796283674278E-04
 2000     55    55     87    29        17  .2102815708808E-09  .2827305866024E-04
 3000     55    55     87    29        26  .3318049319890E-09  .3551514648392E-04
 4000     55    55     87    29        34  .4207345946321E-09  .3999229236069E-04
 5000     54    54     85    29        43  .8360630976109E-09  .5637567655509E-04
 6000     55    55     86    29        51  .6948466782958E-09  .5139450534962E-04
 7000     55    55     86    29        60  .8334699077433E-09  .5628817440982E-04
 8000     54    54     86    29        67  .1308646514148E-08  .7053154758560E-04
 9000     54    54     86    29        77  .1596175347198E-08  .7789553169228E-04
10000     56    56     89    30        87  .7470199523065E-09  .5328908409087E-04
-------------------------------------------------------------------------------
TOTAL    548   548    866   291      4.70 (seconds)    proc= 100.00%
```

25 *** CG Algorithm ***. Function:Extended Maratos

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	66	31	151	64	10	-.5003121103484E+03	.1524219109890E-05
2000	64	29	149	62	20	-.1000624220697E+04	.1297841726565E-04
3000	70	32	162	68	32	-.1500936331045E+04	.1513674655340E-05
4000	66	31	155	63	41	-.2001248441393E+04	.1948563638180E-05
5000	64	28	147	61	48	-.2501560551742E+04	.1078186820796E-04
6000	66	33	154	62	62	-.3001872662090E+04	.6490211027086E-05
7000	68	32	153	63	72	-.3502184772439E+04	.9020171857248E-05
8000	73	35	164	68	88	-.4002496882787E+04	.2608795411898E-04
9000	72	33	164	68	99	-.4502808993135E+04	.4538917975881E-06
10000	71	34	161	67	108	-.5003121103484E+04	.2223813269595E-04
TOTAL	680	318	1560	646	5.80 (seconds)	proc= 46.76%	

26 *** CG Algorithm ***. Function:CLIFF (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	10	9	36	6	2	.9989330686357E+02	.2223713673043E-05
2000	12	11	38	6	5	.1997866136777E+03	.6013945242352E-07
3000	13	11	27	6	6	.2996799292830E+03	.4187273588943E-04
4000	8	6	24	7	6	.3995732273622E+03	.5399659751456E-04
5000	9	6	28	8	9	.4994665342747E+03	.4013355332580E-05
6000	9	6	27	8	10	.5993598417449E+03	.1193901221862E-04
7000	8	6	27	7	12	.6992531478777E+03	.9830189775698E-05
8000	8	6	27	7	13	.7991464548898E+03	.7405140903842E-04
9000	8	6	28	7	15	.8990397615542E+03	.1871453090630E-04
10000	8	6	26	7	16	.9989330685194E+03	.3527015017717E-04
TOTAL	93	73	288	69	.94 (seconds)	proc= 78.49%	

27 *** CG Algorithm ***. Function:Quadratic Diagonal Perturbed

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	163	32	282	118	23	.2177048296734E-10	.1686329842133E-05
2000	211	42	367	155	61	.2086584650551E-10	.4368048951115E-05
3000	259	52	454	194	112	.9333083206708E-11	.4894285010853E-05
4000	308	54	549	240	180	.1183792344091E-10	.7928982629367E-05
5000	318	58	565	246	230	.3516232673602E-10	.2329852576593E-04
6000	359	68	632	272	311	.2746112256031E-10	.1321754388712E-04
7000	371	71	654	282	374	.4371256955409E-10	.6063477963706E-04
8000	524	99	921	396	605	.1611423435098E-10	.9670242624234E-05
9000	491	96	859	367	636	.2624626103675E-10	.4986205754542E-05
10000	441	86	767	325	632	.3542171314814E-10	.2896232943413E-04
TOTAL	3445	658	6050	2595	31.64 (seconds)	proc= 19.10%	

28 *** CG Algorithm ***. Function:WOODS (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	31	11	59	26	8	.5273946312275E-11	.1841905568536E-04
2000	25	9	49	22	12	.3467032947708E-13	.2538920338659E-06
3000	24	10	48	22	18	.1941960497653E-09	.1671918339263E-04
4000	28	10	54	24	27	.1552302759560E-13	.4393443132536E-05
5000	29	8	57	26	35	.3040375145171E-16	.2356117571598E-06
6000	26	9	50	22	38	.3108163031171E-14	.2463761365197E-05
7000	24	8	46	20	40	.2989199216721E-10	.4576377284979E-04
8000	29	11	54	23	55	.6527251125252E-11	.4939096811871E-04
9000	25	11	49	22	54	.1758023699675E-08	.5317519822080E-04
10000	29	12	55	24	69	.1462082557161E-09	.1453498135282E-04
TOTAL	270	99	521	231	3.56 (seconds)	proc= 36.67%	

29 *** CG Algorithm ***. Function:Extended Hiebert

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	85	52	184	83	13	.3560340088339E-17	.1869566468961E-06
2000	85	52	179	83	26	.6182389578476E-17	.2536150850125E-06
3000	85	52	182	83	38	.6955187737388E-17	.2671064744388E-06
4000	85	52	177	83	50	.1356041874386E-17	.1187773003215E-06
5000	83	54	169	82	62	.2303353511936E-09	.2290584659655E-04
6000	85	52	176	83	76	.6791590333843E-16	.7407278512961E-06
7000	85	52	175	83	87	.1962236712981E-16	.4518274301348E-06
8000	85	52	176	83	101	.7507272327475E-17	.2794717960932E-06
9000	85	52	175	83	113	.3382703291450E-16	.5932378416197E-06
10000	85	52	180	83	127	.8423514971773E-16	.9361459579229E-06
TOTAL	848	522	1773	829	6.93 (seconds)	proc= 61.56%	

30 *** CG Algorithm ***. Function:Quadratic QF1

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	334	98	531	196	31	-.4999999999361E-03	.2332582369935E-05
2000	526	159	837	310	98	-.2499999998800E-03	.2402669988639E-05
3000	552	173	871	318	154	-.1666666664068E-03	.3472770087741E-05
4000	785	244	1247	461	291	-.1249999994830E-03	.3204101898874E-05
5000	753	223	1195	441	350	-.9999999997505E-04	.3978121138097E-05
6000	916	289	1437	520	508	-.8333333276330E-04	.6003792655755E-05
7000	977	300	1560	582	634	-.7142857139454E-04	.3980630861996E-05
8000	962	309	1525	562	713	-.6249999968777E-04	.4658198020373E-05
9000	1192	358	1892	699	995	-.5555555542583E-04	.2465512165656E-05
10000	1117	329	1782	664	1035	-.4999999987297E-04	.8500333377645E-05
TOTAL	8114	2482	12877	4753	48.09 (seconds)	proc= 30.59%	

31 *** CG Algorithm ***. Function:Extended Quadratic Penalty QP1

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	9	7	23	9	1	.3990006250000E+04	.4092622648185E-06
2000	903	901	30003	902	2057	.7990003125000E+04	.5253488768579E-06
3000	8	6	22	8	4	.1199000208333E+05	.8935208763385E-06
4000	9	7	28	9	7	.1599000156250E+05	.1058856363206E-05
5000	25	24	472	23	85	.1999000125000E+05	.7500579233219E-06
6000	860	858	28523	860	5892	.2399000104167E+05	.9358443433036E-06
7000	32	30	566	32	146	.2799000089285E+05	.8433512505743E-06
8000	2001	1999	67067	2000	18495	.3199000078125E+05	.1224646091043E-04
9000	2001	1998	67007	2000	20750	.3599000069445E+05	.2869490113796E-05
10000	20	19	279	19	107	.3999000062499E+05	.5662834079142E-06
TOTAL	5868	5849	193990	5862	475.44 (seconds)	proc= 99.68%	

32 *** CG Algorithm ***. Function:Extended Quadratic Penalty QP2

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	36	19	87	33	8	.7139856180527E-16	.3191533509667E-06
2000	36	19	86	34	18	.3730214373775E-17	.7724624925554E-07
3000	43	22	104	40	33	.1185293160391E-15	.2177423432239E-07
4000	40	20	106	37	43	.2386232483086E-15	.3089487120358E-07
5000	38	20	99	36	51	.2201519717426E-11	.2967515027924E-05
6000	44	21	123	41	74	.2111511454388E-19	.2906208151094E-09
7000	43	22	99	39	75	.2576871670858E-15	.3210527623741E-07
8000	42	21	106	38	87	.2478357439393E-17	.3148559949925E-08
9000	42	21	110	38	101	.7109474332595E-17	.1066513354266E-06
10000	40	20	104	37	106	.4411288395189E-14	.1328350845105E-06
TOTAL	404	205	1024	373	5.96 (seconds)	proc= 50.74%	

33 *** CG Algorithm ***. Function:Quadratic QF2

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	363	114	571	207	76	-.1000124968766E+01	.1626010580663E-05
2000	2001	1610	2354	350	573	-.1000062492189E+01	.3208007904312E-04
3000	615	191	982	363	369	-.1000041663195E+01	.2047370225648E-05
4000	754	226	1192	435	607	-.1000031248047E+01	.2126207844735E-05
5000	2001	1408	2527	522	1472	-.1000024998748E+01	.3767474731378E-04
6000	2001	1445	2489	485	1802	-.1000020832463E+01	.3858066152915E-04
7000	2001	1340	2574	572	2154	-.1000017856503E+01	.3984124716327E-04
8000	1269	432	2030	747	1861	-.1000015624512E+01	.1095517888347E-05
9000	1233	376	1952	716	2151	-.1000013888503E+01	.6847086138614E-05
10000	2001	1362	2558	556	3112	-.1000012499686E+01	.4748159846597E-04
TOTAL	14239	8504	19229	4953	141.77 (seconds)	proc= 59.72%	

34 *** CG Algorithm ***. Function:Extended EP1

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	2	2	5	2	0	.7931762881473E+04	.5427376174645E-08
2000	3	3	6	2	1	.1586352576295E+05	.1185543339228E-08
3000	3	3	6	2	1	.2379528864442E+05	.2225548739908E-10
4000	3	3	6	2	2	.3172705152589E+05	.2620573871782E-10
5000	3	3	6	2	2	.3965881440736E+05	.1529755802112E-09
6000	3	3	6	2	2	.4759057728884E+05	.2073590669368E-09
7000	3	3	6	2	3	.5552234017031E+05	.1121914841985E-09
8000	2	2	4	1	2	.6345410305178E+05	.3908987923302E-04
9000	3	3	6	2	3	.7138586593325E+05	.2528642697408E-09
10000	4	4	7	2	5	.7931762881473E+05	.6092834570204E-10
TOTAL	29	29	58	19	.21 (seconds)	proc= 100.00%	

35 *** CG Algorithm ***. Function:Extended Tridiagonal 2

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	37	17	60	22	5	.3893393944764E+03	.3309646507653E-05
2000	41	21	79	28	12	.7790685180765E+03	.3895607102257E-05
3000	42	25	79	28	19	.1168797641676E+04	.4362786916534E-05
4000	36	23	66	22	21	.1558526765277E+04	.4158044213161E-05
5000	31	16	54	20	22	.1948255888877E+04	.4719059265390E-05
6000	35	19	65	24	32	.2337985012477E+04	.3686067353361E-05
7000	34	18	55	17	33	.2727714136076E+04	.3251143322398E-05
8000	37	19	64	22	42	.3117443259676E+04	.1570182827057E-05
9000	37	19	65	25	48	.3507172383276E+04	.3978811266793E-05
10000	37	21	78	24	57	.3896901506876E+04	.4959750944810E-05
TOTAL	367	198	665	232	2.91 (seconds)	proc= 53.95%	

36 *** CG Algorithm ***. Function:BDQRTIC (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	1858	1721	48209	1820	9532	.3983817950577E+04	.9849782403694E-06
2000	2001	1862	49263	1923	19545	.7989427682540E+04	.4367411094538E-04
3000	2001	1879	53165	1967	31536	.1199503741451E+05	.3626705512961E-04
4000	2001	1835	51054	1952	40483	.1600064714647E+05	.2193436853702E-03
5000	2001	1863	51806	1960	51345	.2000625687844E+05	.7697762118934E-04
6000	2001	1824	46701	1931	55717	.2401186661040E+05	.2384663066837E-04
7000	2001	1874	6491	387	9885	.2801747634240E+05	.5865212696020E-02
8000	2001	1914	23105	879	37314	.3202308607434E+05	.1170915488237E-02
9000	2001	1809	22916	1185	41790	.3602869580629E+05	.1092183523079E-04
10000	2001	1869	50920	1958	101130	.4003430553826E+05	.2510355388194E-03
TOTAL	19867	18450	403630	15962	3982.77 (seconds)	proc= 92.87%	

37 *** CG Algorithm ***. Function:TRIDIA (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	1258	384	1982	723	171	.5778101922918E-12	.8129183683301E-05
2000	2001	590	3199	1198	551	.1648193886326E-11	.8522163577070E-05
3000	1847	559	2967	1119	762	.4668384447111E-13	.7298929521155E-05
4000	1991	598	3163	1171	1090	.2047368514409E-12	.1036556580073E-04
5000	2001	612	3195	1194	1371	.1280711152166E-05	.5771701617396E-02
6000	2001	587	3218	1217	1648	.6689757100417E-08	.2210689043630E-03
7000	2001	609	3178	1177	1913	.5562767815456E-08	.4589718217447E-03
8000	2001	614	3183	1182	2187	.3712576694518E-09	.2596713637409E-03
9000	2001	592	3192	1191	2463	.1571995765265E-03	.8607732036221E-01
10000	2001	610	3182	1181	2730	.3462300775594E-04	.2631464921460E-01
TOTAL	19103	5755	30459	11353	148.86 (seconds)	proc= 30.13%	

38 *** CG Algorithm ***. Function:ARWHEAD (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	5	4	10	4	2	.4723477468535E-12	.3004013162108E-05
2000	12	7	21	8	10	.0000000000000E+00	.2476997385238E-06
3000	10	6	21	9	13	.0000000000000E+00	.3510294237092E-08
4000	10	6	24	9	20	.0000000000000E+00	.3216588198333E-07
5000	6	4	14	5	15	.0000000000000E+00	.4359492256284E-06
6000	6	4	14	5	18	.0000000000000E+00	.3607663903848E-06
7000	10	6	22	9	33	.0000000000000E+00	.3293140044921E-06
8000	4	3	10	3	18	.0000000000000E+00	.1394711780412E-06
9000	4	3	10	3	18	.0000000000000E+00	.1232330036060E-06
10000	8	5	18	7	39	.0000000000000E+00	.8447341625902E-07
TOTAL	75	48	164	62	1.86 (seconds)	proc= 64.00%	

39 *** CG Algorithm ***. Function:NONDIA (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	20	10	41	18	6	.7884619712256E-17	.4299470721724E-07
2000	9	6	19	7	6	.6311052902558E-24	.1596767162937E-10
3000	9	6	19	7	8	.1080275554908E-15	.7623271599306E-08
4000	7	4	14	5	9	.3564247416432E-09	.1199537516784E-04
5000	7	4	14	5	10	.1510907591081E-09	.6985914116912E-05
6000	7	4	14	5	13	.7374470401096E-10	.4455549787480E-05
7000	7	4	14	5	15	.5438300732218E-10	.3542515279786E-05
8000	7	4	14	5	16	.2368413247045E-10	.2186866509048E-05
9000	7	4	14	5	20	.1485902806899E-10	.1633134439358E-05
10000	7	4	14	5	21	.9788081956391E-11	.1257490479019E-05
TOTAL	87	50	177	67	1.24 (seconds)	proc= 57.47%	

40 *** CG Algorithm ***. Function:NONDQUAR (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	1559	285	2919	1346	463	.4633225453780E-05	.3621377276312E-05
2000	1962	366	3697	1700	1173	.5902602618044E-05	.4110190608771E-05
3000	1916	352	3623	1666	1721	.5047741068941E-05	.3848492589291E-05
4000	1595	319	3015	1388	1909	.6543310390444E-05	.4951276718440E-05
5000	1569	314	2972	1362	2348	.7661713698751E-05	.5233971482757E-05
6000	1774	374	3350	1519	3186	.6120789159629E-05	.5132974698273E-05
7000	1668	342	3169	1443	3499	.6829425174224E-05	.5871758361451E-05
8000	2001	417	3795	1725	4794	.6654820553284E-05	.2411655883044E-04
9000	1981	415	3757	1708	5341	.6815481285501E-05	.4967800410245E-05
10000	2001	444	3794	1728	6010	.7038129306049E-05	.3711709693957E-04
TOTAL	18026	3628	34091	15585	304.44 (seconds)	proc= 20.13%	

41 *** CG Algorithm ***. Function:DQDRTIC (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	7	1	15	7	2	.2890924304487E-14	.2361138106822E-06
2000	7	0	15	7	3	.1620995643401E-12	.1507676184599E-05
3000	10	0	21	10	8	.4596942565702E-18	.1921752230756E-07
4000	10	0	21	10	10	.9626468715502E-16	.2781283565297E-06
5000	10	0	21	10	13	.1694677128327E-16	.1166956716148E-06
6000	10	0	21	10	16	.1468138138041E-14	.1086210256880E-05
7000	10	0	21	10	17	.5648116610824E-15	.6737088644375E-06
8000	7	2	15	7	15	.1199943955601E-13	.2772045375075E-06
9000	6	2	13	6	15	.4392760375515E-16	.1174828635938E-06
10000	6	2	13	6	16	.5583459914411E-15	.4149366004537E-06
TOTAL	83	7	176	83	1.15 (seconds)	proc= 8.43%	

42 *** CG Algorithm ***. Function:EG2 (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	2001	1898	61616	1990	2669	-.9989473932851E+03	.4992259581315E-04
2000	2001	1875	59765	1991	5190	-.1998947289934E+04	.2509264843092E-03
3000	2001	1841	58517	1981	7634	-.2998947372872E+04	.1815080742762E-03
4000	2001	1866	59692	1977	10386	-.3998946340625E+04	.3047017495631E-03
5000	2001	1901	61872	1996	13420	-.4998942304949E+04	.7862635860900E-03
6000	2001	1917	62667	1986	16245	-.5998942750349E+04	.1114161137994E-02
7000	2001	1884	60494	1990	18400	-.6998945526149E+04	.3039584344836E-03
8000	2001	1859	59547	1989	264095	-.7998945228601E+04	.3994661921673E-03
9000	2001	1834	57521	1984	22576	-.8998946949259E+04	.3064152468086E-03
10000	2001	1889	61017	1990	26411	-.9998938546744E+04	.1187388946657E-02
TOTAL	20010	18764	602708	19874	3870.26 (seconds)	proc= 93.77%	

43 *** CG Algorithm ***. Function:DIXMAANA (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	6	4	12	5	3	.1000000000000E+01	.1117490072651E-05
2000	6	3	12	5	6	.1000000000003E+01	.3449010628757E-05
3000	6	3	12	5	11	.1000000000003E+01	.3292135710279E-05
4000	6	3	12	5	13	.1000000000005E+01	.4490920600920E-05
5000	6	4	12	5	17	.1000000000007E+01	.5230582332359E-05
6000	6	3	12	5	20	.1000000000006E+01	.5026831148478E-05
7000	6	3	12	5	24	.1000000000010E+01	.6142433710467E-05
8000	6	4	12	5	27	.1000000000011E+01	.6665953313602E-05
9000	6	3	12	5	31	.1000000000010E+01	.6339490265340E-05
10000	6	3	12	5	33	.1000000000013E+01	.7366583405986E-05
TOTAL	60	33	120	50	1.85 (seconds)	proc= 55.00%	

44 *** CG Algorithm ***. Function:DIXMAANB (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	10	10	17	6	5	.1000000000000E+01	.1258664703292E-05
2000	11	11	19	7	11	.1000000000000E+01	.4260436930331E-06
3000	11	10	19	7	17	.1000000000000E+01	.1612844190273E-06
4000	11	11	19	7	22	.1000000000000E+01	.8273191564646E-06
5000	11	11	19	7	27	.1000000000000E+01	.1267939023588E-05
6000	11	10	19	7	33	.1000000000001E+01	.1532546152421E-05
7000	11	11	19	7	38	.1000000000001E+01	.1883698517078E-05
8000	11	10	19	7	44	.1000000000001E+01	.2153442872389E-05
9000	11	10	19	7	49	.1000000000001E+01	.2331971344895E-05
10000	11	9	19	7	56	.1000000000000E+01	.1537999122380E-05
TOTAL	109	103	188	69	3.02 (seconds)	proc= 94.50%	

45 *** CG Algorithm ***. Function:DIXMAANC (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	14	14	25	10	7	.1000000000000E+01	.4095121831864E-06
2000	15	14	26	10	15	.1000000000000E+01	.7192638470232E-07
3000	15	13	26	10	22	.1000000000000E+01	.1430188478119E-06
4000	14	13	24	9	28	.1000000000007E+01	.5407285022273E-05
5000	14	13	24	9	34	.1000000000005E+01	.4683193620006E-05
6000	14	13	24	9	41	.1000000000005E+01	.4496101974298E-05
7000	15	15	26	10	53	.1000000000000E+01	.1846653061066E-06
8000	14	12	24	9	55	.1000000000000E+01	.7587335522286E-06
9000	14	12	24	9	62	.1000000000001E+01	.2018751821746E-05
10000	15	15	26	10	74	.1000000000000E+01	.1769899330817E-06
TOTAL	144	134	249	95	3.91 (seconds)	proc= 93.06%	

46 *** CG Algorithm ***. Function:DIXMAANE (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	225	69	361	135	125	.1000000000235E+01	.4148274737232E-05
2000	281	86	450	168	312	.1000000000067E+01	.4133273686749E-05
3000	425	129	671	245	698	.1000000000110E+01	.3612326555843E-05
4000	346	106	551	204	763	.1000000000357E+01	.5456155152189E-05
5000	415	128	658	242	1138	.1000000001358E+01	.5556689299045E-05
6000	677	197	1065	387	2217	.1000000001131E+01	.5530523685288E-05
7000	491	149	778	286	1883	.1000000000535E+01	.2360604446464E-05
8000	705	210	1132	425	3130	.1000000001395E+01	.2618943474633E-05
9000	592	179	943	350	2934	.1000000000614E+01	.6809260369574E-05
10000	584	170	937	352	3236	.1000000000610E+01	.2151857985729E-05
TOTAL	4741	1423	7546	2794	164.36 (seconds)	proc= 30.01%	

47 *** CG Algorithm ***. Function:Partial Perturbed Quadratic

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	184	47	310	125	292	.2338899851991E-12	.9255430588953E-05
2000	252	62	429	176	1565	.6213602156133E-13	.7402012026825E-05
3000	249	57	424	174	3441	.1493130833969E-12	.7118560542014E-05
4000	134	28	235	100	3374	.2997718721403E-12	.1162393391044E-04
5000	83	19	147	63	3302	.2710137596337E-12	.7732461438394E-05
6000	66	15	115	48	3721	.1396165613622E-12	.1224316748288E-04
7000	34	6	62	27	2726	.2120261636544E-12	.2513618656659E-04
8000	25	4	47	21	2697	.9536224687673E-13	.1468371141067E-04
9000	20	2	38	17	2760	.1199685033673E-12	.2786470085798E-04
10000	21	2	40	18	3584	.2355026055407E-13	.1178124845363E-04
TOTAL	1068	242	1847	769	274.62 (seconds)	proc= 22.66%	

48 *** CG Algorithm ***. Function:Broyden Tridiagonal

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	37	16	63	22	4	.6874616482385E-13	.1978003017777E-05
2000	67	24	109	39	13	.3970671034876E+00	.2860060382987E-05
3000	84	32	130	43	24	.3970671034878E+00	.1925318635542E-05
4000	71	28	110	36	28	.3970671034878E+00	.4093900534687E-05
5000	81	31	130	46	39	.3970671034879E+00	.3474896223918E-05
6000	83	30	127	41	48	.3970671034878E+00	.1879021651206E-05
7000	88	37	136	45	61	.3970671034880E+00	.1749283584284E-05
8000	72	28	119	44	56	.3970671034876E+00	.1387065396947E-05
9000	78	27	126	45	68	.3970671034876E+00	.3307191399255E-05
10000	74	28	119	42	72	.3970671034876E+00	.1836687694209E-05
TOTAL	735	281	1169	403	4.13 (seconds)	proc= 38.23%	

49 *** CG Algorithm ***. Function:Almost Perturbed Quadratic

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	333	92	538	204	31	.1439805688184E-12	.3081405868342E-05
2000	494	150	779	284	92	.1939173786000E-12	.3672471070232E-05
3000	687	205	1092	404	192	.2378787581687E-13	.2291045400720E-05
4000	669	214	1068	398	250	.2412514678446E-12	.2665909858470E-05
5000	627	183	1003	375	292	.6121302082704E-13	.2817026592211E-05
6000	969	287	1545	575	542	.9209114485451E-14	.3328016276725E-05
7000	1066	325	1685	618	696	.2058094964188E-12	.2624318299931E-05
8000	998	300	1595	596	744	.9354532763664E-13	.1938560855152E-05
9000	1065	320	1701	635	893	.1206303465709E-14	.3118960577522E-05
10000	1144	360	1818	673	1065	.3135168325543E-13	.3548271685557E-05
TOTAL	8052	2436	12824	4762	47.97 (seconds)	proc= 30.25%	

50 *** CG Algorithm ***. Function:Tridiagonal Perturbed Quadratic

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	293	82	477	183	41	.3473995441678E-12	.3885590083520E-05
2000	547	161	873	325	151	.6428542074818E-13	.3398444840847E-05
3000	618	187	981	362	255	.1103565913844E-13	.2361426830733E-05
4000	605	182	955	349	332	.2511325630695E-12	.3130945022176E-05
5000	712	213	1139	426	492	.9107022395081E-13	.3151970118372E-05
6000	727	215	1155	427	599	.1277409177771E-12	.6700042867114E-05
7000	961	290	1519	557	924	.7694589316644E-14	.5979894557825E-05
8000	946	277	1497	550	1039	.5344064995887E-13	.2650493724158E-05
9000	1128	353	1794	665	1397	.9385477444752E-13	.5397206439767E-05
10000	1174	349	1877	702	1618	.3118647512248E-13	.5678733984294E-05
TOTAL	7711	2309	12267	4546	68.48 (seconds)	proc= 29.94%	

51 *** CG Algorithm ***. Function:EDENSCH (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	67	52	1050	54	112	.6003284592021E+04	.9389520913465E-06
2000	29	14	52	18	16	.1200328459202E+05	.1573327003560E-05
3000	46	32	434	34	144	.1800328459202E+05	.2116587403161E-05
4000	54	40	648	42	286	.2400328459202E+05	.1654717384903E-06
5000	76	61	1608	68	844	.3000328459202E+05	.9057092227299E-06
6000	103	90	2380	95	1530	.3600328459202E+05	.9163125505851E-06
7000	41	27	568	36	431	.4200328459202E+05	.9830434091709E-06
8000	56	41	925	45	784	.4800328459202E+05	.1027730881054E-05
9000	88	75	1875	80	1815	.5400328459202E+05	.8032427202808E-06
10000	59	45	1000	52	1085	.6000328459202E+05	.9638127700622E-06
TOTAL	619	477	10540	524	70.47 (seconds)	proc= 77.06%	

52 *** CG Algorithm ***. Function:VARDIM (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	16	16	43	16	4	.3877744387227E-28	.1245430750741E-13
2000	17	17	45	17	8	.1251360562969E-24	.7074915018484E-12
3000	19	19	50	19	14	.5446283363694E-26	.1475978775416E-12
4000	17	17	49	17	17	.5077236482861E-23	.4506544788576E-11
5000	14	14	46	14	19	.1713812642544E-26	.8279644056466E-13
6000	18	18	49	18	26	.5405750704308E-25	.4650054066055E-12
7000	20	20	53	20	33	.7132950525955E-23	.5341516835490E-11
8000	19	19	65	19	43	.2386857778293E-22	.9771095697603E-11
9000	20	20	54	18	44	.1377573007645E-26	.7423134129586E-13
10000	17	17	52	17	45	.2718780562940E-22	.1042838542238E-10
TOTAL	177	177	506	175	2.53 (seconds)	proc= 100.00%	

53 *** CG Algorithm ***. Function:STAIRCASE S1

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2

1000	2001	618	3170	1169	272	.9257191589152E-04	.2029313034009E-03
2000	2001	586	3204	1203	545	.7816516283307E-03	.2589667476099E-03
3000	2001	606	3193	1191	817	.1370194028925E-02	.1473943695168E-02
4000	2001	595	3179	1177	1085	.3380152502569E-02	.2225607482705E-02
5000	2001	597	3187	1185	1361	.5321560330239E-02	.2500841166797E-02
6000	2001	599	3191	1190	1632	.4427215525041E-02	.4435973587172E-02
7000	2001	612	3191	1190	1905	.6898590069698E-02	.2976947293867E-02
8000	2001	587	3195	1193	2177	.7773317814103E-02	.6299008437963E-03
9000	2001	632	3183	1181	2455	.1114870409486E-01	.9036106544505E-03
10000	2001	587	3220	1218	2731	.1477024654594E-01	.2144443912148E-02
TOTAL	20010	6019	31913	11897	149.80 (seconds)	proc= 30.08%	

54 *** CG Algorithm ***. Function:LIARWHD (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	18	10	42	18	4	.7870933842533E-10	.1793068173081E-04
2000	18	10	41	17	8	.6365893729917E-10	.1602091581093E-04
3000	18	8	39	18	11	.3154437240176E-12	.1336891011166E-05
4000	23	11	49	22	19	.1133588296918E-21	.2694417764832E-08
5000	23	13	52	23	25	.7596317865693E-12	.1745968185807E-05
6000	27	17	60	27	35	.3017659095525E-19	.3478940787450E-09
7000	27	14	62	26	41	.3133233461315E-20	.1873856920385E-07
8000	21	11	49	20	37	.4507922635715E-16	.1344163078289E-07
9000	20	11	46	19	39	.1630728199772E-20	.1532758479243E-07
10000	16	10	37	15	34	.1722442097866E-21	.2635295431772E-10
TOTAL	211	115	477	205	2.53 (seconds)	proc= 54.50%	

55 *** CG Algorithm ***. Function:Diagonal 6

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	4	4	9	4	1	.0000000000000E+00	.1635068505867E-06
2000	4	4	9	4	1	.0000000000000E+00	.2278951236133E-06
3000	4	4	9	4	2	.0000000000000E+00	.2772844745533E-06
4000	4	4	9	4	3	.8881784197001E-12	.3189158483321E-06
5000	4	4	9	4	3	.0000000000000E+00	.3555910834320E-06
6000	4	4	9	4	4	.0000000000000E+00	.3887464920343E-06
7000	4	4	9	4	5	.0000000000000E+00	.4192350801175E-06
8000	4	4	9	4	5	.0000000000000E+00	.4476124930707E-06
9000	4	4	9	4	6	.0000000000000E+00	.4742646551588E-06
10000	4	4	9	4	7	.0000000000000E+00	.4994725775011E-06
TOTAL	40	40	90	40	.37 (seconds)	proc= 100.00%	

56 *** CG Algorithm ***. Function:DIXON3DQ (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	2001	592	3168	1167	249	.2539058352249E-02	.1325342758906E-02
2000	2001	595	3168	1167	460	.3200822373967E-02	.4163769424809E-03
3000	2001	606	3161	1160	630	.1069985545367E-01	.1809705238015E-02
4000	2001	604	3176	1175	766	.1540005744501E-01	.3831801769579E-02
5000	2001	604	3176	1175	883	.1540005744501E-01	.3831801769579E-02
6000	2001	604	3176	1175	997	.1540005744501E-01	.3831801769579E-02
7000	2001	604	3176	1175	1109	.1540005744501E-01	.3831801769579E-02
8000	2001	604	3176	1175	1225	.1540005744501E-01	.3831801769579E-02
9000	2001	604	3176	1175	1340	.1540005744501E-01	.3831801769579E-02
10000	2001	604	3176	1175	1454	.1540005744501E-01	.3831801769579E-02
TOTAL	20010	6021	31729	11719	91.13 (seconds)	proc= 30.09%	

57 *** CG Algorithm ***. Function:ENGVAL1 (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2

1000	26	9	48	19	3	.1108194718785E+04	.1217634780325E-05
2000	32	17	52	17	6	.2218313143943E+04	.3217040810275E-05
3000	25	11	46	17	7	.3328431569101E+04	.2050410261195E-05
4000	50	38	559	40	32	.4438549994258E+04	.9043378933654E-06
5000	35	25	156	28	20	.5548668419416E+04	.5951534632530E-06
6000	50	39	661	43	52	.6658786844573E+04	.8552353136287E-06
7000	49	36	724	38	62	.7768905269731E+04	.1000132377181E-05
8000	27	19	101	23	24	.8879023694889E+04	.2089912079363E-06
9000	54	43	946	50	95	.9989142120047E+04	.7736776286050E-06
10000	26	15	47	19	25	.1109926054521E+05	.3327203177213E-05
TOTAL	374	252	3340	294	3.26 (seconds)	proc= 67.38%	

58 *** CG Algorithm ***. Function:Extended DENSCHNA (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	18	10	30	11	4	.1036411079621E-09	.1337839973011E-04
2000	9	6	18	8	5	.6197801053881E-17	.8053980777791E-08
3000	9	6	18	8	6	.8870505951601E-17	.9634447909838E-08
4000	9	6	18	8	9	.1156785983452E-16	.1100139673678E-07
5000	9	6	18	8	11	.1427978578071E-16	.1222239858564E-07
6000	9	6	18	8	13	.1699977981728E-16	.1333508053305E-07
7000	9	6	18	8	15	.1972414099292E-16	.1436331104385E-07
8000	9	6	18	8	18	.2245075334041E-16	.1532339256895E-07
9000	9	6	18	8	20	.2517841262964E-16	.1622704831558E-07
10000	9	6	18	8	22	.2790639680822E-16	.1708302182252E-07
TOTAL	99	64	192	83	1.23 (seconds)	proc= 64.65%	

59 *** CG Algorithm ***. Function:Extended DENSCHNC (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	12	9	24	10	5	.2923965829747E-17	.1403932627906E-07
2000	13	8	27	11	12	.1912693628996E-10	.8471763683397E-05
3000	16	10	31	12	21	.2193121115747E-18	.3856129127690E-08
4000	15	10	29	11	26	.1009994413894E-18	.2617607058047E-08
5000	17	11	36	11	40	.6994926886767E-16	.6909321213828E-07
6000	14	9	30	11	40	.3428965537812E-16	.2199041867167E-07
7000	16	10	34	13	54	.1668815669837E-14	.3365350096838E-06
8000	19	14	34	12	62	.2615376849160E-12	.4171363723346E-05
9000	15	10	27	9	57	.1983417365136E-10	.1322764622546E-04
10000	14	9	27	12	61	.1202361520231E-17	.9058614218923E-08
TOTAL	151	100	299	112	3.78 (seconds)	proc= 66.23%	

60 *** CG Algorithm ***. Function:Extended DENSCHNB (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	6	4	13	6	1	.6000126852898E-10	.1935137266901E-04
2000	6	4	13	6	3	.5232463056161E-10	.1823650089427E-04
3000	6	4	13	6	4	.5296629197799E-10	.1842630999225E-04
4000	6	4	13	6	6	.5541711545646E-10	.1889685509187E-04
5000	5	4	11	5	6	.7053787297444E-09	.5657676018143E-04
6000	5	4	11	5	7	.7524360841725E-09	.5837869280442E-04
7000	5	4	11	5	9	.8003081625256E-09	.6016318092943E-04
8000	5	4	11	5	9	.8484149600799E-09	.6190846157722E-04
9000	5	4	11	5	11	.8964784423495E-09	.6360674560783E-04
10000	5	4	11	5	12	.9443605141212E-09	.6525624971462E-04
TOTAL	54	40	118	54	.68 (seconds)	proc= 74.07%	

61 *** CG Algorithm ***. Function:Extended DENSCHNF (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	19	17	34	14	8	.8213811841051E-13	.4520105567378E-05

2000	20	16	35	14	16	.1710194399989E-11	.2026832252648E-04
3000	19	16	35	15	24	.3432436355537E-11	.3742608608065E-04
4000	21	18	38	16	36	.8849885147563E-12	.1295992139311E-04
5000	17	15	29	11	33	.9357583724566E-11	.3862621189236E-04
6000	18	15	32	13	44	.9548768566674E-11	.3608947705404E-04
7000	19	15	33	13	53	.4163438990531E-11	.3779889642925E-04
8000	18	17	31	12	57	.5513417522140E-11	.2678138842802E-04
9000	18	17	30	11	63	.2374525280066E-11	.3898869995849E-04
10000	19	17	32	12	74	.1613223238338E-11	.2324113743671E-04
TOTAL	188	163	329	131	4.08 (seconds)	proc= 86.70%	

62 *** CG Algorithm ***. Function:SINQUAD (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	365	209	677	237	93	.1066555203755E-05	.2158058371801E-05
2000	204	90	464	186	120	.5231371497073E-05	.5079988420675E-05
3000	189	84	429	183	170	.4313070549468E-04	.2094912914912E-04
4000	255	119	604	240	307	.6617332396405E-05	.4317230931087E-05
5000	231	103	562	221	361	.3385644821790E-04	.1342753498038E-04
6000	328	173	748	311	583	.5246742772352E-04	.1722502018609E-04
7000	171	88	407	162	365	.3115485836507E-04	.1062555369754E-04
8000	387	189	903	369	939	.3919624586124E-04	.1191932400505E-04
9000	248	129	571	237	666	.6450953575234E-04	.1652320583904E-04
10000	284	130	687	275	884	.4717010368875E-04	.1227643799961E-04
TOTAL	2662	1314	6052	2421	44.88 (seconds)	proc= 49.36%	

63 *** CG Algorithm ***. Function:BIGGSB1 (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	2001	576	3209	1208	250	.8346042136034E-03	.2291978198529E-02
2000	2001	599	3216	1215	461	.2200969493722E-02	.2184065861905E-02
3000	2001	597	3189	1188	633	.2582395974875E-02	.5464898079031E-03
4000	2001	599	3198	1197	768	.1827063618695E-02	.7814192688785E-03
5000	2001	599	3198	1197	883	.1827063618695E-02	.7814192688785E-03
6000	2001	599	3198	1197	997	.1827063618695E-02	.7814192688785E-03
7000	2001	599	3198	1197	1112	.1827063618695E-02	.7814192688785E-03
8000	2001	599	3198	1197	1226	.1827063618695E-02	.7814192688785E-03
9000	2001	599	3198	1197	1340	.1827063618695E-02	.7814192688785E-03
10000	2001	599	3198	1197	1456	.1827063618695E-02	.7814192688785E-03
TOTAL	20010	5965	32000	11990	91.26 (seconds)	proc= 29.81%	

64 *** CG Algorithm ***. Function:Extended Block-Diagonal BD2

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	11	7	21	9	3	.2038172474061E-16	.9772899691432E-08
2000	11	7	21	9	8	.4734926316467E-14	.2332803471664E-06
3000	10	7	20	9	10	.3371412997278E-13	.4257594228957E-06
4000	10	7	20	9	13	.1113620025415E-13	.2401271809944E-06
5000	10	7	20	9	17	.6737331717568E-14	.1935845798555E-06
6000	10	7	20	9	21	.4948835832059E-14	.1770041365032E-06
7000	10	7	20	9	23	.3806737284151E-14	.1692733434813E-06
8000	10	7	20	9	28	.2863700895533E-14	.1628197013388E-06
9000	10	7	20	9	30	.2013181124998E-14	.1532353140167E-06
10000	10	7	20	9	34	.1261904411368E-14	.1371621637206E-06
TOTAL	102	70	202	90	1.87 (seconds)	proc= 68.63%	

65 *** CG Algorithm ***. Function:Generalized quartic GQ1

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

n	iter	irs	fgcnt	lscnt	time(c)	fxnew	gnorm2
1000	7	5	18	7	2	.4811023808162E-17	.4414090562499E-08
2000	7	5	19	7	3	.6002160195683E-14	.1599736005939E-06

```
 3000      8     5     21     8         6  .9775707140328E-22  .2777435985889E-10
 4000      7     4     19     7         6  .4698454679490E-14  .1372006397724E-06
 5000      7     5     19     7         9  .6018162513953E-16  .1563977184227E-07
 6000      7     5     19     7        10  .1325397336108E-12  .7954343824010E-06
 7000      8     5     22     8        13  .1520965276812E-18  .1101026899531E-08
 8000      7     6     18     5        13  .9501217486310E-13  .6338389137421E-06
 9000      8     6     21     7        17  .4759891011375E-19  .5941771525970E-09
10000      7     4     20     7        18  .1162261252176E-12  .7377883010876E-06
-------------------------------------------------------------------------------
TOTAL     73    50    196    70       .97 (seconds)    proc= 68.49%
```

66 *** CG Algorithm ***. Function:Diagonal 7

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      4     4     11     4         1 -.8168486188980E+03  .1363607719195E-10
 2000      4     4     11     4         1 -.1633697237796E+04  .2885697699735E-10
 3000      4     4     11     4         3 -.2450545856694E+04  .2152653448349E-10
 4000      4     4     11     4         2 -.3267394475592E+04  .4749455516291E-10
 5000      4     4     11     4         4 -.4084243094491E+04  .4518726096092E-10
 6000      4     4     11     4         5 -.4901091713388E+04  .1499796499390E-10
 7000      4     4     11     4         5 -.5717940332287E+04  .5365206404996E-10
 8000      4     4     11     4         6 -.6534788951183E+04  .7010676448770E-10
 9000      4     4     11     4         7 -.7351637570085E+04  .4798607184851E-10
10000      4     4     11     4         7 -.8168486188979E+04  .2566835632933E-10
-------------------------------------------------------------------------------
TOTAL     40    40    110    40       .41 (seconds)    proc= 100.00%
```

67 *** CG Algorithm ***. Function:Diagonal 8

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      3     3      7     3         1 -.4804530139182E+03  .3370130083545E-05
 2000      3     3      7     3         1 -.9609060278364E+03  .5713179020282E-05
 3000      3     3      7     3         2 -.1441359041755E+04  .7574473557831E-05
 4000      3     3      7     3         3 -.1921812055673E+04  .9166955998447E-05
 5000      3     3      7     3         3 -.2402265069591E+04  .1058155985619E-04
 6000      3     3      7     3         4 -.2882718083509E+04  .1186727786182E-04
 7000      3     3      7     3         5 -.3363171097426E+04  .1305417727929E-04
 8000      3     3      7     3         5 -.3843624111347E+04  .1416195487360E-04
 9000      3     3      7     3         6 -.4324077125265E+04  .1520456633901E-04
10000      3     3      7     3         6 -.4804530139181E+04  .1619212288695E-04
-------------------------------------------------------------------------------
TOTAL     30    30     70    30       .36 (seconds)    proc= 100.00%
```

68 *** CG Algorithm ***. Function:Full Hessian

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      3     3      7     3         1 -.2499999374896E+00  .9830333712015E-12
 2000      3     3      7     3         1 -.2499999843737E+00  .6454588798443E-13
 3000      3     3      7     3         2 -.2499999930552E+00  .1939820480292E-11
 4000      3     3      7     3         3 -.2499999960936E+00  .5090708529436E-11
 5000      3     3      7     3         3 -.2499999974999E+00  .1376186040036E-10
 6000      3     3      7     3         4 -.2499999982639E+00  .4317074786089E-11
 7000      3     3      7     3         4 -.2499999987244E+00  .2020312314901E-10
 8000      3     3      7     3         5 -.2499999990235E+00  .2552045109538E-10
 9000      3     3      7     3         6 -.2499999992284E+00  .4392052669189E-11
10000      3     3      7     3         6 -.2499999993751E+00  .9647838083993E-11
-------------------------------------------------------------------------------
TOTAL     30    30     70    30       .35 (seconds)    proc= 100.00%
```

69 *** CG Algorithm ***. Function:SINCOS

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      6     5     13     6         2  .3865995282465E+03  .5099011441643E-05
 2000      6     5     13     6         5  .7731990564929E+03  .7888043828141E-05
 3000      6     5     13     6         7  .1159798584739E+04  .2516688951112E-04
```

```
 4000      7     5     15     7        10  .1546398112986E+04  .6609147740573E-06
 5000      7     5     15     7        13  .1932997641232E+04  .7926933845687E-06
 6000      7     5     15     7        16  .2319597169479E+04  .9182867490645E-06
 7000      7     5     15     7        18  .2706196697725E+04  .1035596703525E-05
 8000      7     5     15     7        21  .3092796225972E+04  .1112637587256E-05
 9000      7     5     15     7        23  .3479395754218E+04  .1213443872231E-05
10000      7     5     15     7        26  .3865995282465E+04  .1265656030357E-05
-------------------------------------------------------------------------------
TOTAL     67    50    144    67      1.41 (seconds)    proc= 74.63%
```

70 *** CG Algorithm ***. Function:Generalized quartic GQ2

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     33    10     55    21         8  .2178756169591E-12  .1598952141824E-05
 2000     30     8     53    22        14  .1256933518645E-12  .1316598984495E-05
 3000     30     9     52    21        21  .3350604057016E-12  .1801513564242E-05
 4000     33    12     54    20        29  .6344360008369E-12  .2747774116920E-05
 5000     35    13     57    21        41  .3922227370755E-12  .1477456722123E-05
 6000     30    11     48    17        40  .1240220148773E-11  .3075989105290E-05
 7000     38    16     56    17        56  .1905529915032E-12  .2847688067488E-05
 8000     35    12     56    20        62  .1465156560159E-12  .1551117409740E-05
 9000     33    12     56    22        68  .6300763250638E-12  .2085135915265E-05
10000     34    15     52    17        73  .2313763517168E-12  .1615148038440E-05
-------------------------------------------------------------------------------
TOTAL    331   118    539   198      4.12 (seconds)    proc= 35.65%
```

71 *** CG Algorithm ***. Function:EXTROSNB (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000   2001   602   3367  1320       540  .2676201117345E-04  .2520593781804E-02
 2000   2001   596   3369  1325      1076  .2443964626696E-04  .1366413041543E-01
 3000   2001   593   3413  1340      1635  .2086747555914E-04  .1291586379128E-03
 4000   2001  1344   2669   632      1784  .7626537624091E-04  .4564187839505E-01
 5000   2001   569   3428  1371      2701  .2223680477590E-04  .9629121601479E-04
 6000   2001   614   3342  1298      3198  .3354591068897E-04  .1534780196505E-03
 7000   2001   595   3370  1318      3787  .2263652546313E-04  .1959320224502E-03
 8000   2001   598   3421  1334      4329  .2404211143594E-04  .4310798960354E-03
 9000   2001   579   3387  1333      4852  .1849029789630E-04  .1454674748695E-01
10000   2001   599   3383  1321      5385  .2034107774649E-04  .9852982943115E-02
-------------------------------------------------------------------------------
TOTAL  20010  6689  33149 12592    292.87 (seconds)    proc= 33.43%
```

72 *** CG Algorithm ***. Function:ARGLINB (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      1     1      3     1         1  .2000000000000E+00  .2079456736898E-06
 2000      1     1      3     1         0  .2000000000000E+00  .4995873990550E-05
 3000      1     1      3     1         0  .2000000000000E+00  .2151999076694E-04
 4000      2     2      5     2         1  .2000000000000E+00  .1765964167399E-04
 5000      2     2      5     2         1  .2000000000000E+00  .1289299361902E-04
 6000      2     2      5     2         2  .2000000000000E+00  .1079644060842E-04
 7000      9     9    129     9        12  .2000000000000E+00  .1009669441094E-04
 8000      8     8    147     8        14  .2000000000000E+00  .2230511975809E-04
 9000      2     2      5     2         3  .2000000000000E+00  .3393623515840E-04
10000      3     3     10     3         3  .2000000000000E+00  .3597184292290E-04
-------------------------------------------------------------------------------
TOTAL     31    31    315    31       .37 (seconds)    proc= 100.00%
```

73 *** CG Algorithm ***. Function:FLETCHCR (CUTE)

betatype = 3 (Polak - Ribiere - Polyak). stoptest= 1

```
    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000     25     6     49    21         4  .2500671526056E-14  .2864345118009E-05
 2000     77    44    830    55        62  .4964243546265E+02  .1274793484185E-05
 3000     79    55   1403    71       144  .4964243546265E+02  .9247460173527E-06
 4000     92    68   1590    75       234  .4964243546265E+02  .9700785746483E-06
```

```
 5000     27     6     57    25        21  .3630638867469E-15  .1068628935434E-05
 6000     48    19     82    31        40  .4964243546265E+02  .2415286375940E-05
 7000     24     6     49    22        25  .7036146056737E-15  .1499169317097E-05
 8000     24     4     50    23        29  .2189119366521E-15  .8295224560293E-06
 9000     61    23    100    35        73  .4964243546265E+02  .1801050241177E-05
10000     69    34    195    37        94  .4964243546265E+02  .1431109641950E-05
-------------------------------------------------------------------------------
TOTAL    526   265   4405   395      7.26 (seconds)    proc= 50.38%


 74  *** CG Algorithm ***. Function:Extended Himmelblau  HIMMELBG (CUTE)

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      8     8     10     1         2  .1367897922942E-03  .7838706974472E-05
 2000      8     8     10     1         2  .2882598693807E-03  .1167719297620E-04
 3000      8     8     10     1         5  .4424038228947E-03  .1463100228739E-04
 4000      8     8     10     1         5  .5979322564865E-03  .1712403393044E-04
 5000      8     8     10     1         7  .7543441883008E-03  .1932177541811E-04
 6000      8     8     10     1         9  .9113891195307E-03  .2130957360966E-04
 7000      8     8     10     1         9  .1068903144054E-02  .2313787787611E-04
 8000      8     8     10     1        11  .1226798508385E-02  .2484005064974E-04
 9000      8     8     10     1        13  .1385002482878E-02  .2643901585664E-04
10000      8     8     10     1        14  .1543451298993E-02  .2795129731911E-04
-------------------------------------------------------------------------------
TOTAL     80    80    100    10       .77 (seconds)    proc= 100.00%


 75  *** CG Algorithm ***. Function:Extended Himmelblau  HIMMELBH (CUTE)

betatype =  3  (Polak - Ribiere - Polyak).  stoptest= 1

    n   iter   irs  fgcnt lscnt   time(c)        fxnew              gnorm2
-------------------------------------------------------------------------------
 1000      6     3     13     6         1 -.5000000000000E+03  .5605298762336E-08
 2000      6     3     13     6         2 -.1000000000000E+04  .8078389235633E-08
 3000      6     3     13     6         3 -.1500000000000E+04  .9869024332528E-08
 4000      6     3     13     6         5 -.2000000000000E+04  .1199507713272E-07
 5000      6     3     13     6         5 -.2500000000000E+04  .2908505411878E-07
 6000      6     3     13     6         6 -.3000000000000E+04  .5207938362460E-07
 7000      6     3     13     6         7 -.3500000000000E+04  .7937104553905E-07
 8000      6     3     13     6         9 -.4000000000000E+04  .1158298045662E-06
 9000      6     3     13     6         9 -.4500000000000E+04  .2909188653801E-07
10000      6     3     13     6        10 -.5000000000000E+04  .2029197531114E-06
-------------------------------------------------------------------------------
TOTAL     60    30    130    60       .57 (seconds)    proc= 50.00%

 ******************************
 CG - Conjugate Gradient package
 betatype =  3 (Polak - Ribiere - Polyak)
 stoptest =  1
 ******************************
```

May 3, 2006