```
"E:\1 □□□□\3 □□□□□\1 □□□□□□\1 □□□□□□□□\1_□□□□□□_□□□□\1_LW _□□□□\4 □□□□\3 python_code\1 exzample\2 □□□□□□\9 Code for this paper\Scripts\python.exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=17169

import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['E:\\1 □□□□\\3 □□□□□\\1 □□□□□□\\1 □□□□□□□□\\1_□□□□□□_□□□□\\1_LW _□□□□\\4 □□□□\\3 python_code\\9 Code for this paper', 'E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper'])

PyDev console: starting.

Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
>>> runfile('E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper/main_RO_BDC.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper')
Backend TkAgg is interactive backend. Turning interactive mode on.
Waiting 5s.....
Set parameter MIPGap to value 1e-10
Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)

CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
Thread count: 4 physical cores, 8 logical processors, using up to 8 threads

Optimize a model with 644962 rows, 64824 columns and 1819064 nonzeros
Model fingerprint: 0x82863e15
Variable types: 1 continuous, 64823 integer (64779 binary)
Coefficient statistics:
  Matrix range     [1e+00, 1e+10]
  Objective range  [1e+00, 2e+01]
  Bounds range     [1e+00, 1e+00]
  RHS range        [1e+00, 2e+10]
Warning: Model contains large matrix coefficients
Warning: Model contains large rhs
         Consider reformulating model or setting NumericFocus parameter
         to avoid numerical issues.
Presolve removed 428716 rows and 34151 columns (presolve time = 5s) ...
Presolve removed 531943 rows and 45359 columns
Presolve time: 9.25s
Presolved: 113019 rows, 19465 columns, 304981 nonzeros
Variable types: 0 continuous, 19465 integer (19432 binary)

Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
Showing first log only...

Root relaxation presolved: 19465 rows, 132484 columns, 324446 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.5300000e+02   0.000000e+00   8.350000e+02     10s
Concurrent spin time: 0.02s

Solved with dual simplex (primal model)

Root relaxation: objective 5.530000e+02, 2205 iterations, 0.44 seconds (0.40 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

     0     0  553.00000    0    8          -  553.00000      -     -   10s
H    0     0                     553.0000000  553.00000  0.00%     -   10s
     0     0  553.00000    0    8  553.00000  553.00000  0.00%     -   10s

Explored 1 nodes (6243 simplex iterations) in 11.01 seconds (18.95 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 553

Optimal solution found (tolerance 1.00e-10)
Best objective 5.530000000000e+02, best bound 5.530000000000e+02, gap 0.0000%
Set parameter MIPGap to value 1e-08
Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)

CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
Thread count: 4 physical cores, 8 logical processors, using up to 8 threads

Optimize a model with 3645474 rows, 2881123 columns and 25541618 nonzeros
Model fingerprint: 0xa4a7a56c
Variable types: 1422995 continuous, 1458128 integer (1450703 binary)
Coefficient statistics:
  Matrix range     [1e-01, 1e+10]
  Objective range  [6e-05, 5e+01]
  Bounds range     [1e+00, 8e+01]
  RHS range        [8e-01, 1e+10]
```

```
Warning: Model contains large matrix coefficients
Warning: Model contains large rhs
         Consider reformulating model or setting NumericFocus parameter
         to avoid numerical issues.
Presolve removed 3642254 rows and 2879733 columns (presolve time = 5s) ...
Presolve removed 3644301 rows and 2880702 columns
Presolve time: 8.06s
Presolved: 1173 rows, 421 columns, 3135 nonzeros
Variable types: 0 continuous, 421 integer (258 binary)
Found heuristic solution: objective 4065.0394527
Found heuristic solution: objective 4110.0394527

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.6910395e+03   4.299375e+02   0.000000e+00     10s
     395    4.5860395e+03   0.000000e+00   0.000000e+00     10s

Root relaxation: objective 4.586039e+03, 395 iterations, 0.02 seconds (0.00 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

H    0     0                    4586.0394527 6851.03945  49.4%     -   10s
     0     0          -    0     4586.03945 4586.03945  0.00%     -   10s

Explored 1 nodes (596 simplex iterations) in 10.62 seconds (11.03 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 4586.04 4110.04 4065.04

Optimal solution found (tolerance 1.00e-08)
Best objective 4.586039452672e+03, best bound 4.586039452672e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□4586

  Itr = 0
Collect_LB =   [553.0]
Collect_UB =   [9725.078905344453]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [4586.039452672227]
Collect_MPObjValNHua =   [553.0]


Set parameter TimeLimit to value 7200
Set parameter MIPGap to value 0.05
Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)

CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
Thread count: 4 physical cores, 8 logical processors, using up to 8 threads

Optimize a model with 653155 rows, 410400 columns and 1827334 nonzeros
Model fingerprint: 0x0a247f4a
Variable types: 1 continuous, 410399 integer (410355 binary)
Coefficient statistics:
  Matrix range     [1e+00, 1e+10]
  Objective range  [1e+00, 2e+01]
  Bounds range     [1e+00, 1e+00]
  RHS range        [1e+00, 2e+10]
Warning: Model contains large matrix coefficients
Warning: Model contains large rhs
         Consider reformulating model or setting NumericFocus parameter
         to avoid numerical issues.
Presolve removed 503592 rows and 390398 columns (presolve time = 5s) ...
Presolve removed 503592 rows and 390398 columns (presolve time = 10s) ...
Presolve removed 594472 rows and 400285 columns
Presolve time: 10.97s
Presolved: 58683 rows, 10115 columns, 150647 nonzeros
Variable types: 0 continuous, 10115 integer (10082 binary)

Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
Showing first log only...

Root relaxation presolved: 10115 rows, 68798 columns, 160762 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.1461823e+03   0.000000e+00   3.886000e+03     11s
Concurrent spin time: 0.06s

Solved with dual simplex (primal model)

```

```
Root relaxation: objective 5.146182e+03, 3316 iterations, 0.33 seconds (0.30 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

     0     0 5146.18231    0   21          - 5146.18231      -     -   11s
     0     0 5146.18231    0  113          - 5146.18231      -     -   13s
     0     0 5146.18231    0   83          - 5146.18231      -     -   13s
     0     0 5146.18231    0   57          - 5146.18231      -     -   14s
     0     0 5146.18231    0   86          - 5146.18231      -     -   15s
     0     0 5146.18231    0   86          - 5146.18231      -     -   15s
     0     0 5146.18231    0   88          - 5146.18231      -     -   16s
     0     0 5146.18231    0   76          - 5146.18231      -     -   16s
     0     0 5146.18231    0  107          - 5146.18231      -     -   16s
     0     0 5146.18231    0   81          - 5146.18231      -     -   17s
     0     0 5146.18231    0  180          - 5146.18231      -     -   17s
     0     0 5146.18231    0  179          - 5146.18231      -     -   17s
     0     0 5146.18231    0   82          - 5146.18231      -     -   18s
     0     0 5146.18231    0   82          - 5146.18231      -     -   19s
H    0     0                 5146.1823098 5146.18231  0.00%     -   22s
     0     0 5146.18231    0   82 5146.18231 5146.18231  0.00%     -   22s

Cutting planes:
  Learned: 1
  Gomory: 3
  Cover: 111
  Implied bound: 21
  Clique: 292
  MIR: 76
  StrongCG: 64
  GUB cover: 5
  Zero half: 4
  RLT: 5
  Relax-and-lift: 11
  BQP: 29
  PSD: 2

Explored 1 nodes (38559 simplex iterations) in 22.24 seconds (30.08 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 5146.18

Optimal solution found (tolerance 5.00e-02)
Best objective 5.146182309815e+03, best bound 5.146182309815e+03, gap 0.0000%
Set parameter MIPGap to value 1e-08
Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)

CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
Thread count: 4 physical cores, 8 logical processors, using up to 8 threads

Optimize a model with 3645474 rows, 2881123 columns and 25541618 nonzeros
Model fingerprint: 0xf07e9e51
Variable types: 1422995 continuous, 1458128 integer (1450703 binary)
Coefficient statistics:
  Matrix range     [1e-01, 1e+10]
  Objective range  [6e-05, 5e+01]
  Bounds range     [1e+00, 8e+01]
  RHS range        [8e-01, 1e+10]
Warning: Model contains large matrix coefficients
Warning: Model contains large rhs
         Consider reformulating model or setting NumericFocus parameter
         to avoid numerical issues.
Presolve removed 3641418 rows and 2879511 columns (presolve time = 6s) ...
Presolve removed 3642213 rows and 2879962 columns
Presolve time: 8.39s
Presolved: 3261 rows, 1161 columns, 8732 nonzeros
Variable types: 10 continuous, 1151 integer (683 binary)
Found heuristic solution: objective 3620.2813655

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    8.4090000e+03   3.016512e+03   0.000000e+00     10s
     969    4.9582444e+03   0.000000e+00   0.000000e+00     11s

Root relaxation: objective 4.958244e+03, 969 iterations, 0.01 seconds (0.01 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

     0     0 4958.24444    0   61 3620.28137 4958.24444  37.0%     -   10s
H    0     0                 4000.4444444 4958.24444  23.9%     -   10s
H    0     0                 4852.4444444 4958.24444  2.18%     -   10s
     0     0 4957.44444    0   47 4852.44444 4957.44444  2.16%     -   10s
```

```
248  H    0     0                4952.7202709 4957.44444  0.10%     -   10s
249  H    0     0                4954.1111111 4957.44444  0.07%     -   10s
250       0     0 4957.23839    0   56 4954.11111 4957.23839  0.06%     -   10s
251       0     0 4956.35478    0    9 4954.11111 4956.35478  0.05%     -   10s
252       0     0 4956.35478    0    6 4954.11111 4956.35478  0.05%     -   10s
253  H    0     0                4956.1241966 4956.35478  0.00%     -   10s
254  H    0     0                4956.2202709 4956.35478  0.00%     -   10s
255
256  Cutting planes:
257    MIR: 1
258
259  Explored 1 nodes (2046 simplex iterations) in 11.19 seconds (10.51 work units)
260  Thread count was 8 (of 8 available processors)
261
262  Solution count 6: 4956.22 4954.11 4952.72 ... 3620.28
263
264  Optimal solution found (tolerance 1.00e-08)
265  Best objective 4.956220270938e+03, best bound 4.956220270938e+03, gap 0.0000%
266  SP is solved
267  SP's optimal solution is'□4956
268
269   Itr = 1
270  Collect_LB =   [553.0, 5146.1823098150835]
271  Collect_UB =   [9725.078905344453, 5516.3631280805985]
272  Collect_Hua =   [0.0, 4586.039452672227]
273  Collect_SPObjVal =   [4586.039452672227, 4956.220270937742]
274  Collect_MPObjValNHua =   [553.0, 560.1428571428569]
275
276
277  Set parameter TimeLimit to value 7200
278  Set parameter MIPGap to value 0.05
279  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
280
281  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
282  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
283
284  Optimize a model with 653156 rows, 410400 columns and 1827357 nonzeros
285  Model fingerprint: 0xa86c8ccc
286  Variable types: 1 continuous, 410399 integer (410355 binary)
287  Coefficient statistics:
288    Matrix range     [1e+00, 1e+10]
289    Objective range  [1e+00, 2e+01]
290    Bounds range     [1e+00, 1e+00]
291    RHS range        [1e+00, 2e+10]
292  Warning: Model contains large matrix coefficients
293  Warning: Model contains large rhs
294           Consider reformulating model or setting NumericFocus parameter
295           to avoid numerical issues.
296  Presolve removed 503364 rows and 390303 columns (presolve time = 5s) ...
297  Presolve removed 503364 rows and 390303 columns (presolve time = 10s) ...
298  Presolve removed 594492 rows and 400287 columns
299  Presolve time: 11.78s
300  Presolved: 58664 rows, 10113 columns, 150605 nonzeros
301  Variable types: 0 continuous, 10113 integer (10080 binary)
302
303  Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
304  Showing first log only...
305
306  Root relaxation presolved: 10113 rows, 68777 columns, 160718 nonzeros
307
308
309  Root simplex log...
310
311  Iteration    Objective       Primal Inf.    Dual Inf.      Time
312         0    5.5117203e+03   0.000000e+00   3.883000e+03     12s
313  Concurrent spin time: 0.01s
314
315  Solved with dual simplex (primal model)
316
317  Root relaxation: objective 5.511720e+03, 3485 iterations, 0.38 seconds (0.39 work units)
318
319      Nodes    |    Current Node    |     Objective Bounds      |     Work
320   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
321
322       0     0 5511.72027    0   31          - 5511.72027      -     -   12s
323       0     0 5511.72027    0  130          - 5511.72027      -     -   13s
324       0     0 5511.72027    0  155          - 5511.72027      -     -   14s
325       0     0 5511.72027    0  148          - 5511.72027      -     -   14s
326       0     0 5511.72027    0   67          - 5511.72027      -     -   17s
327       0     0 5511.72027    0   34          - 5511.72027      -     -   21s
328       0     0 5511.72027    0  235          - 5511.72027      -     -   21s
329       0     0 5511.72027    0  232          - 5511.72027      -     -   21s
330       0     0 5511.72027    0   54          - 5511.72027      -     -   23s
331       0     0 5511.72027    0   83          - 5511.72027      -     -   23s
```

```
H    0     0                    5771.7202709 5511.72027  4.50%     -   24s
     0     0 5511.72027    0   56 5771.72027 5511.72027  4.50%     -   24s

Cutting planes:
  Learned: 3
  Gomory: 4
  Cover: 113
  Implied bound: 33
  Clique: 609
  MIR: 202
  StrongCG: 147
  GUB cover: 17
  Zero half: 18
  RLT: 10
  Relax-and-lift: 29
  BQP: 15
  PSD: 3

Explored 1 nodes (50277 simplex iterations) in 24.79 seconds (29.30 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 5771.72

Optimal solution found (tolerance 5.00e-02)
Best objective 5.771720270938e+03, best bound 5.511720270938e+03, gap 4.5047%
Set parameter MIPGap to value 1e-08
Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)

CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
Thread count: 4 physical cores, 8 logical processors, using up to 8 threads

Optimize a model with 3645474 rows, 2881123 columns and 25541618 nonzeros
Model fingerprint: 0x9ec232ca
Variable types: 1422995 continuous, 1458128 integer (1450703 binary)
Coefficient statistics:
  Matrix range     [1e-01, 1e+10]
  Objective range  [6e-05, 5e+01]
  Bounds range     [1e+00, 8e+01]
  RHS range        [8e-01, 1e+10]
Warning: Model contains large matrix coefficients
Warning: Model contains large rhs
         Consider reformulating model or setting NumericFocus parameter
         to avoid numerical issues.
Presolve removed 3640530 rows and 2879269 columns (presolve time = 5s) ...
Presolve removed 3642376 rows and 2880070 columns
Presolve time: 7.71s
Presolved: 3098 rows, 1053 columns, 8257 nonzeros
Variable types: 10 continuous, 1043 integer (613 binary)
Found heuristic solution: objective 3978.8594268

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    9.1190000e+03   4.289887e+03   0.000000e+00     10s
     878    4.9942444e+03   0.000000e+00   0.000000e+00     10s

Root relaxation: objective 4.994244e+03, 878 iterations, 0.02 seconds (0.01 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

     0     0 4994.24444    0   61 3978.85943 4994.24444  25.5%     -    9s
H    0     0                    4867.4444444 4994.24444  2.61%     -    9s
H    0     0                    4967.4444444 4994.24444  0.54%     -    9s
     0     0 4993.44444    0   24 4967.44444 4993.44444  0.52%     -    9s
     0     0 4993.44444    0   22 4967.44444 4993.44444  0.52%     -    9s
     0     0 4993.38228    0   25 4967.44444 4993.38228  0.52%     -    9s
     0     0 4992.88846    0   17 4967.44444 4992.88846  0.51%     -    9s
H    0     0                    4992.2202709 4992.88846  0.01%     -    9s
     0     0     cutoff    0      4992.22027 4992.22027  0.00%     -    9s

Cutting planes:
  Learned: 3
  Gomory: 3
  Cover: 13
  Implied bound: 9
  Clique: 18
  MIR: 3
  StrongCG: 1
  Flow cover: 5
  Zero half: 4
  RLT: 2
  Relax-and-lift: 3
  PSD: 2
```

```
416
417  Explored 1 nodes (1795 simplex iterations) in 10.40 seconds (10.47 work units)
418  Thread count was 8 (of 8 available processors)
419
420  Solution count 4: 4992.22 4967.44 4867.44 3978.86
421
422  Optimal solution found (tolerance 1.00e-08)
423  Best objective 4.992220270938e+03, best bound 4.992220270938e+03, gap 0.0000%
424  SP is solved
425  SP's optimal solution is'□4992
426
427   Itr = 2
428  Collect_LB =   [553.0, 5146.1823098150835, 5771.720270937742]
429  Collect_UB =   [9725.078905344453, 5516.3631280805985, 5516.3631280805985]
430  Collect_Hua =   [0.0, 4586.039452672227, 4956.220270937742]
431  Collect_SPObjVal =   [4586.039452672227, 4956.220270937742, 4992.220270937742]
432  Collect_MPObjValNHua =   [553.0, 560.1428571428569, 815.5]
433
434
435   Ops, stop iteration
436   Values adopted from the judgeCount's th iteration, and Itr = {2}, judgeCount = {1}
437
438  ~~~~~~~~~~judgeCount = 1, SPObj_SPF = 4956.220270937742
439  Vessel i: 0:     pi: 0-5,     ai-di: 3-12,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 3-12,     taoi-deltai: 3-7,     taoPi_SP-deltaPi_SP: 4-6,     betaNi: 4,     bi
       : 4
440  Vessel i: 1:     pi: 5-10,     ai-di: 4-25,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 4-25,     taoi-deltai: 4-18,     taoPi_SP-deltaPi_SP: 9-18,     betaNi: 14
       ,     bi: 14
441  Vessel i: 2:     pi: 21-26,     ai-di: 9-27,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 9-27,     taoi-deltai: 9-17,     taoPi_SP-deltaPi_SP: 9-17,     betaNi: 8
       ,     bi: 8
442  Vessel i: 3:     pi: 16-21,     ai-di: 9-30,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 9-30,     taoi-deltai: 9-17,     taoPi_SP-deltaPi_SP: 9-17,     betaNi: 8
       ,     bi: 8
443  Vessel i: 4:     pi: 11-16,     ai-di: 14-29,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 14-29,     taoi-deltai: 14-18,     taoPi_SP-deltaPi_SP: 14-18,
       betaNi: 4,     bi: 4
444  Vessel i: 5:     pi: 28-34,     ai-di: 16-28,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 16-28,     taoi-deltai: 16-26,     taoPi_SP-deltaPi_SP: 16-26,
       betaNi: 10,     bi: 10
445  Vessel i: 6:     pi: 14-19,     ai-di: 25-55,     gi_SP-gpi_SP: 0.000000-1.000000,     ai_SP-di: 25-55,     taoi-deltai: 25-36,     taoPi_SP-deltaPi_SP: 25-36,
       betaNi: 11,     bi: 11
446  Vessel i: 7:     pi: 28-34,     ai-di: 32-60,     gi_SP-gpi_SP: 0.875000-0.501232,     ai_SP-di: 39-60,     taoi-deltai: 38-46,     taoPi_SP-deltaPi_SP: 39-46,
       betaNi: 8,     bi: 8
447  Vessel i: 8:     pi: 20-25,     ai-di: 36-80,     gi_SP-gpi_SP: 1.000000-0.600000,     ai_SP-di: 46-80,     taoi-deltai: 46-62,     taoPi_SP-deltaPi_SP: 46-62,
       betaNi: 16,     bi: 16
448  Vessel i: 9:     pi: 15-20,     ai-di: 41-67,     gi_SP-gpi_SP: 0.701232-0.898768,     ai_SP-di: 45-67,     taoi-deltai: 47-58,     taoPi_SP-deltaPi_SP: 47-58,
       betaNi: 11,     bi: 11
449  Vessel i: 10:     pi: 29-34,     ai-di: 50-82,     gi_SP-gpi_SP: 0.423768-0.000000,     ai_SP-di: 52-82,     taoi-deltai: 53-66,     taoPi_SP-deltaPi_SP: 53-66,
       betaNi: 13,     bi: 13
450
451  round LB =   [553, 5146, 5772]
452  round UB =   [9725, 5516, 5516]
453  round Hua =   [0, 4586, 4956]
454  round SPObjVal =   [4586, 4956, 4992]
455  round MPObjValNHua =   [553, 560, 816]
456
457  OptimalObj = 5771.720270937742
458  Time: 848.000000
459
460
461
462
```