```
"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=27490

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_CCG.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 403913 rows, 34789 columns and 1107023 nonzeros
Model fingerprint: 0x0e83549e
Variable types: 1 continuous, 34788 integer (34764 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 236665 rows and 14905 columns (presolve time = 5s) ...
Presolve removed 318210 rows and 23817 columns (presolve time = 10s) ...
Presolve removed 367195 rows and 23817 columns
Presolve time: 10.71s
Presolved: 36718 rows, 10972 columns, 150791 nonzeros
Variable types: 0 continuous, 10972 integer (10954 binary)

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

Root relaxation presolved: 36716 rows, 10974 columns, 150785 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    6.9200000e+02   4.962500e+01   1.100461e+08     11s
Concurrent spin time: 0.01s

Solved with dual simplex (primal model)

Root relaxation: objective 6.920000e+02, 2030 iterations, 0.38 seconds (0.22 work units)

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

     0     0  692.00000    0    4          -  692.00000      -     -   11s
H    0     0                1272.0000000  692.00000  45.6%     -   11s
H    0     0                 952.0000000  692.00000  27.3%     -   12s
H    0     0                 692.0000000  692.00000  0.00%     -   12s
     0     0  692.00000    0    4  692.00000  692.00000  0.00%     -   12s

Explored 1 nodes (7405 simplex iterations) in 12.20 seconds (12.25 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 692 952 1272

Optimal solution found (tolerance 1.00e-10)
Best objective 6.920000000000e+02, best bound 6.920000000000e+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 1153842 rows, 901813 columns and 7829844 nonzeros
Model fingerprint: 0xc15ec65a
Variable types: 441325 continuous, 460488 integer (456438 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 1151447 rows and 900977 columns
Presolve time: 2.79s
Presolved: 2395 rows, 836 columns, 6371 nonzeros
Variable types: 3 continuous, 833 integer (499 binary)
Found heuristic solution: objective 3476.6666667

Root relaxation: objective 4.538684e+03, 706 iterations, 0.00 seconds (0.01 work units)

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

     0     0 4538.68421    0   65 3476.66667 4538.68421  30.5%     -    3s
H    0     0                4450.6666667 4538.68421  1.98%     -    3s
H    0     0                4470.6666667 4538.68421  1.52%     -    3s
H    0     0                4498.6666667 4528.00000  0.65%     -    3s
     0     0 4528.00000    0    4 4498.66667 4528.00000  0.65%     -    3s
H    0     0                4528.0000000 4528.00000  0.00%     -    3s
     0     0 4528.00000    0    4 4528.00000 4528.00000  0.00%     -    3s

Cutting planes:
  Learned: 4
  Gomory: 8
  Cover: 15
  Implied bound: 14
  Clique: 2
  MIR: 5
  StrongCG: 3
  Flow cover: 4
  Zero half: 1
  RLT: 5
  Relax-and-lift: 2
  PSD: 11

Explored 1 nodes (1155 simplex iterations) in 3.76 seconds (3.38 work units)
Thread count was 8 (of 8 available processors)

Solution count 5: 4528 4498.67 4470.67 ... 3476.67

Optimal solution found (tolerance 1.00e-08)
Best objective 4.528000000000e+03, best bound 4.528000000000e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□4528

  Itr = 0
Collect_LB =   [692.0]
Collect_UB =   [9748.000000000004]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [4528.000000000002]
Collect_MPObjValNHua =   [692.0]


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 660171 rows, 150727 columns and 1927792 nonzeros
Model fingerprint: 0x9188e543
Variable types: 1 continuous, 150726 integer (143124 binary)
Coefficient statistics:
  Matrix range     [1e-01, 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 487127 rows and 130334 columns (presolve time = 5s) ...
Presolve removed 495456 rows and 131126 columns (presolve time = 10s) ...
Presolve removed 582170 rows and 139584 columns
Presolve time: 13.91s
Presolved: 78001 rows, 11143 columns, 239254 nonzeros
Variable types: 0 continuous, 11143 integer (9212 binary)

Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
```

```
Showing first log only...

Root relaxation presolved: 11143 rows, 89144 columns, 250397 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.2200000e+03   0.000000e+00   2.645188e+04     15s
    4311    5.2232508e+03   0.000000e+00   5.894858e+04     15s
Concurrent spin time: 0.47s

Solved with dual simplex (primal model)

Root relaxation: objective 5.220000e+03, 5824 iterations, 1.73 seconds (1.60 work units)

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

     0     0 5220.00000    0  206          - 5220.00000      -     -   19s
     0     0 5220.00000    0  436          - 5220.00000      -     -   22s
     0     0 5220.00000    0  429          - 5220.00000      -     -   22s
     0     0 5220.00000    0  448          - 5220.00000      -     -   23s
     0     0 5220.00000    0  304          - 5220.00000      -     -   30s
     0     0 5220.00000    0  321          - 5220.00000      -     -   31s
     0     0 5220.00000    0  298          - 5220.00000      -     -   31s
     0     0 5220.00000    0  298          - 5220.00000      -     -   31s
     0     0 5220.00000    0  138          - 5220.00000      -     -   37s
     0     0 5220.00000    0  148          - 5220.00000      -     -   37s
     0     0 5220.00000    0  107          - 5220.00000      -     -   39s
     0     0 5220.00000    0  269          - 5220.00000      -     -   40s
     0     0 5220.00000    0  241          - 5220.00000      -     -   40s
     0     0 5220.00000    0   79          - 5220.00000      -     -   43s
     0     0 5220.00000    0  265          - 5220.00000      -     -   44s
     0     0 5220.00000    0  107          - 5220.00000      -     -   46s
     0     0 5220.00000    0  142          - 5220.00000      -     -   47s
     0     0 5220.00000    0  218          - 5220.00000      -     -   49s
     0     0 5220.00000    0  228          - 5220.00000      -     -   49s
     0     0 5220.00000    0  211          - 5220.00000      -     -   51s
     0     2 5220.00000    0  156          - 5220.00000      -     -   58s
     3     8 5220.00000    2  478          - 5220.00000      -  3578   61s
    11    16 5220.00000    3  817          - 5220.00000      -  3073   66s
    19    24 5220.00000    5  550          - 5220.00000      -  2887   71s
    28    45 5220.00000    6  538          - 5220.00000      -  2387   77s
    45    66 5220.00000   10  241          - 5220.00000      -  2027   85s
    77   125 5220.00000   16  286          - 5220.00000      -  1700   97s
   155   267 5220.00000   25  342          - 5220.00000      -  1047  113s
   360   499 5220.00000   73  309          - 5220.00000      -   679  133s
   687   955 5220.00000  134  407          - 5220.00000      -   445  150s
  1278  1436 5220.00000  238  286          - 5220.00000      -   286  163s
  1833  1864 5353.41385  318  398          - 5220.00000      -   236  173s
  2330  2799 infeasible  357               - 5220.00000      -   208  184s
  3438  3512 5960.00000  398  167          - 5220.00000      -   153  194s
* 3647  3486             406    6040.0000000 5220.00000  13.6%   149  194s
H 3686  3452                    6000.0000000 5220.00000  13.0%   148  194s
H 4387  3053                    5960.0000000 5220.00000  12.4%   128  195s
  4388  3044 5220.00000  295  211 5960.00000 5220.00000  12.4%   128  221s
  4390  3045 5400.00000  419  401 5960.00000 5220.00000  12.4%   128  233s
  4391  3046 5220.00000  355  346 5960.00000 5220.00000  12.4%   128  246s
  4392  3047 5240.00000  589  341 5960.00000 5220.00000  12.4%   128  253s
  4393  3047 5240.00000  529  429 5960.00000 5220.00000  12.4%   128  272s
  4394  3048 5600.00000  472  473 5960.00000 5220.00000  12.4%   128  279s
H 4394  2895                    5220.0000000 5220.00000  0.00%   128  287s

Cutting planes:
  Gomory: 2
  Cover: 572
  Implied bound: 194
  Projected implied bound: 29
  Clique: 1000
  MIR: 295
  StrongCG: 251
  Flow cover: 69
  GUB cover: 42
  Zero half: 39
  RLT: 32
  Relax-and-lift: 134
  BQP: 8
  PSD: 3

Explored 4394 nodes (736777 simplex iterations) in 287.16 seconds (470.05 work units)
Thread count was 8 (of 8 available processors)

Solution count 4: 5220 5960 6000 6040
```

```
248
249  Optimal solution found (tolerance 5.00e-02)
250  Best objective 5.220000000000e+03, best bound 5.220000000000e+03, gap 0.0000%
251  Set parameter MIPGap to value 1e-08
252  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
253
254  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
255  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
256
257  Optimize a model with 1153842 rows, 901813 columns and 7829844 nonzeros
258  Model fingerprint: 0x0eeda109
259  Variable types: 441325 continuous, 460488 integer (456438 binary)
260  Coefficient statistics:
261    Matrix range     [1e-01, 1e+10]
262    Objective range  [6e-05, 5e+01]
263    Bounds range     [1e+00, 8e+01]
264    RHS range        [8e-01, 1e+10]
265  Warning: Model contains large matrix coefficients
266  Warning: Model contains large rhs
267           Consider reformulating model or setting NumericFocus parameter
268           to avoid numerical issues.
269  Presolve removed 1150027 rows and 900679 columns
270  Presolve time: 2.74s
271  Presolved: 3815 rows, 1134 columns, 10062 nonzeros
272  Variable types: 4 continuous, 1130 integer (640 binary)
273  Found heuristic solution: objective 3326.4013898
274  Found heuristic solution: objective 4038.8027795
275
276  Root relaxation: objective 4.824000e+03, 1110 iterations, 0.02 seconds (0.02 work units)
277
278       Nodes    |    Current Node    |     Objective Bounds      |     Work
279    Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
280
281       0     0 4824.00000    0    8 4038.80278 4824.00000  19.4%     -    3s
282  H    0     0                    4726.0680564 4824.00000  2.07%     -    3s
283  H    0     0                    4821.9569453 4824.00000  0.04%     -    3s
284       0     0 4824.00000    0   12 4821.95695 4824.00000  0.04%     -    3s
285  H    0     0                    4824.0000000 4824.00000  0.00%     -    3s
286
287  Cutting planes:
288    Clique: 1
289    RLT: 1
290
291  Explored 1 nodes (2194 simplex iterations) in 3.83 seconds (3.48 work units)
292  Thread count was 8 (of 8 available processors)
293
294  Solution count 5: 4824 4821.96 4726.07 ... 3326.4
295
296  Optimal solution found (tolerance 1.00e-08)
297  Best objective 4.824000000000e+03, best bound 4.824000000000e+03, gap 0.0000%
298  SP is solved
299  SP's optimal solution is'□4824
300
301    Itr = 1
302  Collect_LB =   [692.0, 5220.0]
303  Collect_UB =   [9748.000000000004, 5516.000000000002]
304  Collect_Hua =   [0.0, 4528.0]
305  Collect_SPObjVal =   [4528.000000000002, 4824.000000000002]
306  Collect_MPObjValNHua =   [692.0, 692.0]
307
308
309  Set parameter MIPGap to value 0.05
310  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
311
312  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
313  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
314
315  Optimize a model with 912804 rows, 163849 columns and 2744921 nonzeros
316  Model fingerprint: 0x65773ea4
317  Variable types: 1 continuous, 163848 integer (148668 binary)
318  Coefficient statistics:
319    Matrix range     [1e-01, 1e+10]
320    Objective range  [1e+00, 2e+01]
321    Bounds range     [1e+00, 1e+00]
322    RHS range        [1e+00, 2e+10]
323  Warning: Model contains large matrix coefficients
324  Warning: Model contains large rhs
325           Consider reformulating model or setting NumericFocus parameter
326           to avoid numerical issues.
327  Presolve removed 703900 rows and 139184 columns (presolve time = 5s) ...
328  Presolve removed 722888 rows and 140888 columns (presolve time = 10s) ...
329  Presolve removed 722888 rows and 140888 columns (presolve time = 15s) ...
330  Presolve removed 800700 rows and 148443 columns
331  Presolve time: 19.47s
```

```
Presolved: 112104 rows, 15406 columns, 363551 nonzeros
Variable types: 0 continuous, 15406 integer (11619 binary)

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

Root relaxation presolved: 15406 rows, 127510 columns, 378957 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.5260000e+03   0.000000e+00   6.622339e+04     21s
   15161    5.5260000e+03   0.000000e+00   0.000000e+00     23s
   15161    5.5260000e+03   0.000000e+00   0.000000e+00     23s
Concurrent spin time: 0.89s

Solved with primal simplex

Root relaxation: objective 5.526000e+03, 15161 iterations, 3.78 seconds (3.31 work units)
Total elapsed time = 26.52s

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

     0     0 5526.00000    0  582          - 5526.00000      -     -   29s
     0     0 5526.00000    0  486          - 5526.00000      -     -   30s
     0     0 5526.00000    0  520          - 5526.00000      -     -   30s
     0     0 5526.00000    0  842          - 5526.00000      -     -   39s
     0     0 5526.00000    0  798          - 5526.00000      -     -   40s
     0     0 5526.00000    0  801          - 5526.00000      -     -   43s
     0     0 5526.00000    0  449          - 5526.00000      -     -   53s
     0     0 5526.00000    0  449          - 5526.00000      -     -   53s
     0     0 5526.00000    0  646          - 5526.00000      -     -   55s
     0     0 5526.00000    0  643          - 5526.00000      -     -   55s
     0     0 5526.00000    0  362          - 5526.00000      -     -   66s
     0     0 5526.00000    0  364          - 5526.00000      -     -   66s
     0     0 5526.00000    0  431          - 5526.00000      -     -   68s
     0     0 5526.00000    0  468          - 5526.00000      -     -   68s
     0     0 5526.00000    0  537          - 5526.00000      -     -   80s
     0     0 5526.00000    0  474          - 5526.00000      -     -   80s
     0     0 5526.00000    0  473          - 5526.00000      -     -   80s
     0     0 5526.00000    0  397          - 5526.00000      -     -   81s
     0     0 5526.00000    0  230          - 5526.00000      -     -   89s
     0     0 5526.00000    0  234          - 5526.00000      -     -   90s
     0     0 5526.00000    0  304          - 5526.00000      -     -   91s
     0     0 5526.00000    0  268          - 5526.00000      -     -   91s
     0     0 5526.00000    0  287          - 5526.00000      -     -  102s
     0     0 5526.00000    0  372          - 5526.00000      -     -  102s
     0     0 5526.00000    0  254          - 5526.00000      -     -  105s
     0     2 5526.00000    0  251          - 5526.00000      -     -  117s
     3     7 5526.00000    2  960          - 5526.00000      -  5716  125s
    15    19 5526.00000    4 1254          - 5526.00000      -  3502  135s
    23    27 5526.00000    5  789          - 5526.00000      -  3677  140s
    33    45 5526.00000    8  735          - 5526.00000      -  3075  152s
    45    69 5526.00000   11  627          - 5526.00000      -  3466  167s
    69   140 5526.00000   13  477          - 5526.00000      -  2899  190s
   205   333 5526.00000   31  302          - 5526.00000      -  1499  228s
   513   724 5526.00000  110  312          - 5526.00000      -   703  252s
  1022  1191 5566.00000  257  100          - 5526.00000      -   402  270s
* 1080   903             308    5566.0000000 5526.00000  0.72%   385  270s

Cutting planes:
  Gomory: 3
  Cover: 618
  Implied bound: 334
  Clique: 5934
  MIR: 192
  StrongCG: 33
  Flow cover: 21
  GUB cover: 89
  Zero half: 46
  RLT: 117
  Relax-and-lift: 644
  BQP: 76
  PSD: 9

Explored 1594 nodes (668193 simplex iterations) in 271.23 seconds (537.04 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 5566

Optimal solution found (tolerance 5.00e-02)
Best objective 5.566000000000e+03, best bound 5.526000000000e+03, gap 0.7186%
```

```
Warning: linear constraint 407539 and linear constraint 660172 have the same name "ConSP25_1[0,0]"
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 1153842 rows, 901813 columns and 7829844 nonzeros
Model fingerprint: 0x08d0e291
Variable types: 441325 continuous, 460488 integer (456438 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 1150638 rows and 900787 columns
Presolve time: 3.02s
Presolved: 3204 rows, 1026 columns, 8474 nonzeros
Variable types: 4 continuous, 1022 integer (584 binary)
Found heuristic solution: objective 4122.6666667

Root relaxation: objective 4.858667e+03, 1152 iterations, 0.03 seconds (0.02 work units)

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

*    0     0               0    4858.6666667 4858.66667  0.00%     -    3s

Explored 1 nodes (1434 simplex iterations) in 4.06 seconds (3.36 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 4858.67 4122.67

Optimal solution found (tolerance 1.00e-08)
Best objective 4.858666666667e+03, best bound 4.858666666667e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□4858

  Itr = 2
Collect_LB =   [692.0, 5220.0, 5566.0]
Collect_UB =   [9748.000000000004, 5516.000000000002, 5516.000000000002]
Collect_Hua =   [0.0, 4528.0, 4824.0]
Collect_SPObjVal =   [4528.000000000002, 4824.000000000002, 4858.666666666668]
Collect_MPObjValNHua =   [692.0, 692.0, 742.0]


  Ops, stop iteration
  Values adopted from the Itr-1' th iteration, and Itr = {2}, judgeCount = {1}

~~~~~~~~~~judgeCount = 1, SPObj_SPF = 4824.000000000002
Vessel i: 0:      pi: 0-5,      ai-di: 3-22,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 3-22,      taoi-deltai: 3-21,      taoPi_SP-deltaPi_SP: 3-21,      betaNi: 18,      bi: 18
Vessel i: 1:      pi: 7-14,      ai-di: 4-25,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 4-25,      taoi-deltai: 4-24,      taoPi_SP-deltaPi_SP: 4-24,      betaNi: 20,      bi: 20
Vessel i: 2:      pi: 14-20,      ai-di: 18-26,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 18-26,      taoi-deltai: 18-25,      taoPi_SP-deltaPi_SP: 18-25,      betaNi: 7,      bi: 7
Vessel i: 3:      pi: 14-20,      ai-di: 26-61,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 26-61,      taoi-deltai: 26-60,      taoPi_SP-deltaPi_SP: 26-60,      betaNi: 34,      bi: 34
Vessel i: 4:      pi: 8-14,      ai-di: 20-68,      gi_SP-gpi_SP: 0.700000-0.900000,      ai_SP-di: 23-68,      taoi-deltai: 25-52,      taoPi_SP-deltaPi_SP: 25-52,      betaNi: 27,      bi: 27
Vessel i: 5:      pi: 21-27,      ai-di: 35-60,      gi_SP-gpi_SP: 0.500000-0.300000,      ai_SP-di: 39-60,      taoi-deltai: 35-44,      taoPi_SP-deltaPi_SP: 39-44,      betaNi: 9,      bi: 9

round LB =   [692, 5220, 5566]
round UB =   [9748, 5516, 5516]
round Hua =   [0, 4528, 4824]
round SPObjVal =   [4528, 4824, 4859]
round MPObjValNHua =   [692, 692, 742]

Time: 893.000000
```