```
"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=7539

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 595616 rows, 58701 columns and 1673824 nonzeros
Model fingerprint: 0x9be0b769
Variable types: 1 continuous, 58700 integer (58660 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 343704 rows and 26015 columns (presolve time = 5s) ...
Presolve removed 429659 rows and 39092 columns (presolve time = 10s) ...
Presolve removed 473248 rows and 39092 columns
Presolve time: 10.49s
Presolved: 122368 rows, 19609 columns, 331758 nonzeros
Variable types: 0 continuous, 19609 integer (19579 binary)

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

Root relaxation presolved: 19609 rows, 141977 columns, 351367 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.4300000e+02   0.000000e+00   1.027000e+03     12s
Concurrent spin time: 0.00s

Solved with dual simplex (primal model)

Root relaxation: objective 7.430000e+02, 2874 iterations, 0.52 seconds (0.54 work units)

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

     0     0  743.00000    0   16          -  743.00000      -     -   12s
H    0     0                     823.0000000  743.00000  9.72%     -   12s
     0     0  743.00000    0   55  823.00000  743.00000  9.72%     -   13s
     0     0  743.00000    0    2  823.00000  743.00000  9.72%     -   18s
     0     0  743.00000    0   28  823.00000  743.00000  9.72%     -   18s
H    0     0                     743.0000000  743.00000  0.00%     -   18s
     0     0  743.00000    0   29  743.00000  743.00000  0.00%     -   18s

Cutting planes:
  Gomory: 1
  Cover: 44
  MIR: 29
  StrongCG: 24
  Relax-and-lift: 1

Explored 1 nodes (12824 simplex iterations) in 18.38 seconds (32.84 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 743 823

Optimal solution found (tolerance 1.00e-10)
Best objective 7.430000000000e+02, best bound 7.430000000000e+02, gap 0.0000%
Set parameter MIPGap to value 1e-08
Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
```

```
 80
 81  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
 82  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
 83
 84  Optimize a model with 3035544 rows, 2395885 columns and 21184927 nonzeros
 85  Model fingerprint: 0x091910e1
 86  Variable types: 1181973 continuous, 1213912 integer (1207162 binary)
 87  Coefficient statistics:
 88    Matrix range     [1e-01, 1e+10]
 89    Objective range  [6e-05, 5e+01]
 90    Bounds range     [1e+00, 8e+01]
 91    RHS range        [8e-01, 1e+10]
 92  Warning: Model contains large matrix coefficients
 93  Warning: Model contains large rhs
 94          Consider reformulating model or setting NumericFocus parameter
 95          to avoid numerical issues.
 96  Presolve removed 3032248 rows and 2394679 columns (presolve time = 5s) ...
 97  Presolve removed 3033311 rows and 2395035 columns
 98  Presolve time: 6.88s
 99  Presolved: 2233 rows, 850 columns, 6060 nonzeros
100  Variable types: 9 continuous, 841 integer (502 binary)
101  Found heuristic solution: objective 3482.4264926
102
103  Root simplex log...
104
105  Iteration    Objective       Primal Inf.    Dual Inf.      Time
106         0    8.2899365e+03   5.941813e+03   0.000000e+00      9s
107       647    4.8614888e+03   0.000000e+00   0.000000e+00      9s
108
109  Root relaxation: objective 4.861489e+03, 647 iterations, 0.00 seconds (0.01 work units)
110
111      Nodes    |    Current Node    |     Objective Bounds      |     Work
112   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
113
114      0     0 4861.48879    0   45 3482.42649 4861.48879  39.6%     -    8s
115  H    0     0                    4854.6166146 4861.48879  0.14%     -    8s
116      0     0 4861.07693    0    7 4854.61661 4861.07693  0.13%     -    8s
117      0     0 4861.07693    0    8 4854.61661 4861.07693  0.13%     -    8s
118  H    0     0                    4860.4829105 4861.07693  0.01%     -    8s
119  H    0     0                    4861.0769320 4861.07693  0.00%     -    8s
120
121  Explored 1 nodes (1204 simplex iterations) in 8.98 seconds (9.78 work units)
122  Thread count was 8 (of 8 available processors)
123
124  Solution count 4: 4861.08 4860.48 4854.62 3482.43
125
126  Optimal solution found (tolerance 1.00e-08)
127  Best objective 4.861076932024e+03, best bound 4.861076933877e+03, gap 0.0000%
128  SP is solved
129  SP's optimal solution is'□4861
130
131    Itr = 0
132  Collect_LB =   [743.0]
133  Collect_UB =   [10465.153864048996]
134  Collect_Hua =   [0.0]
135  Collect_SPObjVal =   [4861.076932024498]
136  Collect_MPObjValNHua =   [743.0]
137
138
139  Set parameter TimeLimit to value 7200
140  Set parameter MIPGap to value 0.05
141  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
142
143  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
144  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
145
146  Optimize a model with 1257465 rows, 366171 columns and 3743932 nonzeros
147  Model fingerprint: 0xe18f9445
148  Variable types: 1 continuous, 366170 integer (353500 binary)
149  Coefficient statistics:
150    Matrix range     [1e-01, 1e+10]
151    Objective range  [1e+00, 2e+01]
152    Bounds range     [1e+00, 1e+00]
153    RHS range        [1e+00, 2e+10]
154  Warning: Model contains large matrix coefficients
155  Warning: Model contains large rhs
156          Consider reformulating model or setting NumericFocus parameter
157          to avoid numerical issues.
158  Presolve removed 988820 rows and 335656 columns (presolve time = 5s) ...
159  Presolve removed 1026022 rows and 339091 columns (presolve time = 10s) ...
160  Presolve removed 1026022 rows and 339091 columns (presolve time = 15s) ...
161  Presolve removed 1026022 rows and 339091 columns (presolve time = 20s) ...
162  Presolve removed 1116433 rows and 348798 columns
163  Presolve time: 21.05s
```

```
Presolved: 141032 rows, 17373 columns, 430785 nonzeros
Variable types: 1 continuous, 17372 integer (14574 binary)

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

Root relaxation presolved: 17373 rows, 158405 columns, 448158 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.6040769e+03   0.000000e+00   9.635125e+03     22s
Concurrent spin time: 0.97s

Solved with dual simplex (primal model)

Root relaxation: objective 5.604077e+03, 8072 iterations, 2.79 seconds (4.27 work units)
Total elapsed time = 29.37s
Total elapsed time = 30.10s

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

     0     0 5604.07693    0  303          - 5604.07693      -     -   32s
     0     0 5604.07693    0  678          - 5604.07693      -     -   36s
     0     0 5604.07693    0  583          - 5604.07693      -     -   38s
     0     0 5604.07693    0  219          - 5604.07693      -     -   45s
     0     0 5604.07693    0  295          - 5604.07693      -     -   45s
     0     0 5604.07693    0  385          - 5604.07693      -     -   51s
     0     0 5604.07693    0  304          - 5604.07693      -     -   52s
     0     0 5604.07693    0   88          - 5604.07693      -     -   57s
     0     0 5604.07693    0  166          - 5604.07693      -     -   58s
     0     0 5604.07693    0  140          - 5604.07693      -     -   68s
     0     0 5604.07693    0  197          - 5604.07693      -     -   68s
     0     0 5604.07693    0  173          - 5604.07693      -     -   69s
     0     0 5604.07693    0  178          - 5604.07693      -     -   75s
     0     0 5604.07693    0  210          - 5604.07693      -     -   75s
     0     0 5604.07693    0   93          - 5604.07693      -     -   78s
     0     0 5604.07693    0   93          - 5604.07693      -     -   80s
H    0     0                    5604.0769320 5604.07693  0.00%     -   90s
     0     0 5604.07693    0   93 5604.07693 5604.07693  0.00%     -   90s

Cutting planes:
  Learned: 4
  Gomory: 5
  Cover: 228
  Implied bound: 73
  Clique: 1667
  MIR: 335
  StrongCG: 139
  Flow cover: 265
  GUB cover: 36
  Zero half: 18
  RLT: 78
  Relax-and-lift: 200
  BQP: 62
  PSD: 1

Explored 1 nodes (146488 simplex iterations) in 90.08 seconds (214.72 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 5604.08

Optimal solution found (tolerance 5.00e-02)
Best objective 5.604076932024e+03, best bound 5.604076932024e+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 3035544 rows, 2395885 columns and 21184927 nonzeros
Model fingerprint: 0x64085dca
Variable types: 1181973 continuous, 1213912 integer (1207162 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 3029984 rows and 2394037 columns (presolve time = 5s) ...
Presolve removed 3030042 rows and 2394055 columns
Presolve time: 6.13s
Presolved: 5502 rows, 1830 columns, 14558 nonzeros
Variable types: 10 continuous, 1820 integer (1058 binary)
Found heuristic solution: objective 4232.1031942

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    1.2604000e+04   1.911614e+04   0.000000e+00      8s
    1860    5.9878730e+03   0.000000e+00   0.000000e+00      8s

Root relaxation: objective 5.987873e+03, 1860 iterations, 0.02 seconds (0.02 work units)

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

     0     0 5987.87302    0   11 4232.10319 5987.87302  41.5%     -    7s
H    0     0                    5986.3015873 5987.87302  0.03%     -    7s
     0     0 5987.87302    0   10 5986.30159 5987.87302  0.03%     -    7s
     0     0 5987.87302    0    8 5986.30159 5987.87302  0.03%     -    7s
H    0     0                    5986.9444444 5987.87302  0.02%     -    7s

Cutting planes:
  Gomory: 1
  MIR: 1

Explored 1 nodes (2792 simplex iterations) in 8.21 seconds (8.69 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 5986.94 5986.3 4232.1

Optimal solution found (tolerance 1.00e-08)
Best objective 5.986944444444e+03, best bound 5.986944444444e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5986

  Itr = 1
Collect_LB =   [743.0, 5604.076932024498]
Collect_UB =   [10465.153864048996, 6729.944444444442]
Collect_Hua =   [0.0, 4861.076932024498]
Collect_SPObjVal =   [4861.076932024498, 5986.944444444442]
Collect_MPObjValNHua =   [743.0, 743.0]


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 1911541 rows, 388041 columns and 5806222 nonzeros
Model fingerprint: 0x7e63c969
Variable types: 1 continuous, 388040 integer (362740 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 1567892 rows and 350836 columns (presolve time = 5s) ...
Presolve removed 1605053 rows and 353839 columns (presolve time = 10s) ...
Presolve removed 1620237 rows and 354849 columns (presolve time = 21s) ...
Presolve removed 1620237 rows and 363560 columns (presolve time = 25s) ...
Presolve removed 1707010 rows and 364580 columns
Presolve time: 26.36s
Presolved: 204531 rows, 23461 columns, 659633 nonzeros
Variable types: 1 continuous, 23460 integer (18006 binary)

Deterministic concurrent LP optimizer: primal simplex, dual simplex, and barrier
Showing barrier log only...

Root relaxation presolved: 23461 rows, 227992 columns, 683094 nonzeros

Root barrier log...

Ordering time: 2.74s

Barrier statistics:
```

```
Dense cols : 32
Free vars  : 816
AA' NZ     : 7.154e+05
Factor NZ  : 2.597e+07 (roughly 300 MB of memory)
Factor Ops : 7.723e+10 (roughly 2 seconds per iteration)
Threads    : 1

                 Objective                Residual
Iter       Primal          Dual         Primal    Dual     Compl     Time
   0  -6.72569266e+07  3.62289678e+04  2.77e+04 1.85e+03  8.91e+04    34s

Barrier performed 0 iterations in 33.58 seconds (54.98 work units)
Barrier solve interrupted - model solved by another algorithm

Concurrent spin time: 1.80s (can be avoided by choosing Method=3)

Solved with primal simplex

Root relaxation: objective 6.732444e+03, 25869 iterations, 6.15 seconds (7.49 work units)
Total elapsed time = 40.31s

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

     0     0 6732.44444    0  686          - 6732.44444      -     -   46s
     0     0 6732.44444    0  677          - 6732.44444      -     -   46s
     0     0 6732.44444    0 1067          - 6732.44444      -     -   57s
     0     0 6732.44444    0  885          - 6732.44444      -     -   61s
     0     0 6732.44444    0  642          - 6732.44444      -     -   86s
     0     0 6732.44444    0  643          - 6732.44444      -     -   89s
     0     0 6732.44444    0  654          - 6732.44444      -     -   89s
     0     0 6732.44444    0  340          - 6732.44444      -     -  105s
     0     0 6732.44444    0  370          - 6732.44444      -     -  107s
     0     0 6732.44444    0  215          - 6732.44444      -     -  114s
     0     0 6732.44444    0  251          - 6732.44444      -     -  116s
     0     0 6732.44444    0  327          - 6732.44444      -     -  128s
     0     0 6732.44444    0  468          - 6732.44444      -     -  129s
     0     0 6732.44444    0  426          - 6732.44444      -     -  142s
     0     0 6732.44444    0  171          - 6732.44444      -     -  151s
H    0     0                 6732.4444444 6732.44444  0.00%     -  177s
     0     0 6732.44444    0  171 6732.44444 6732.44444  0.00%     -  177s

Cutting planes:
  Learned: 7
  Gomory: 7
  Cover: 460
  Implied bound: 632
  Clique: 3839
  MIR: 851
  StrongCG: 169
  Flow cover: 29
  GUB cover: 429
  Zero half: 40
  Network: 1
  RLT: 152
  Relax-and-lift: 453
  BQP: 59
  PSD: 2

Explored 1 nodes (232805 simplex iterations) in 177.43 seconds (472.86 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 6732.44

Optimal solution found (tolerance 5.00e-02)
Best objective 6.732444444444e+03, best bound 6.732444444444e+03, gap 0.0000%
Warning: linear constraint 603390 and linear constraint 1257466 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 3035544 rows, 2395885 columns and 21184927 nonzeros
Model fingerprint: 0xad74d263
Variable types: 1181973 continuous, 1213912 integer (1207162 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 3029642 rows and 2393966 columns (presolve time = 5s) ...
Presolve removed 3029700 rows and 2393984 columns
Presolve time: 6.17s
Presolved: 5844 rows, 1901 columns, 15495 nonzeros
Variable types: 10 continuous, 1891 integer (1095 binary)
Found heuristic solution: objective 4347.4490078

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    1.2724000e+04   1.924820e+04   0.000000e+00      8s
    1703    6.0419444e+03   0.000000e+00   0.000000e+00      8s

Root relaxation: objective 6.041944e+03, 1703 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

H    0     0                    6041.9444444 17457.7778   189%     -    7s
     0     0        -    0      6041.94444 6041.94444  0.00%     -    7s

Explored 1 nodes (2252 simplex iterations) in 8.17 seconds (8.65 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 6041.94 4347.45

Optimal solution found (tolerance 1.00e-08)
Best objective 6.041944444444e+03, best bound 6.041944444444e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□6041

  Itr = 2
Collect_LB =   [743.0, 5604.076932024498, 6732.444444444442]
Collect_UB =   [10465.153864048996, 6729.944444444442, 6729.944444444442]
Collect_Hua =   [0.0, 4861.076932024498, 5986.944444444442]
Collect_SPObjVal =   [4861.076932024498, 5986.944444444442, 6041.944444444442]
Collect_MPObjValNHua =   [743.0, 743.0, 745.5]


  Reach the termination conditions, stop iteration
  Values adopted from the judgeCount's th iteration, and Itr = {2}, judgeCount = {1}

~~~~~~~~~~judgeCount = 1, SPObj_SPF = 5986.944444444442
Vessel i: 0:      pi: 0-5,      ai-di: 5-15,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 5-15,      taoi-deltai: 5-10,      taoPi_SP-deltaPi_SP: 5-10,      betaNi: 5,
bi: 5
Vessel i: 1:      pi: 0-7,      ai-di: 22-44,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 22-44,      taoi-deltai: 22-34,      taoPi_SP-deltaPi_SP: 22-34,      betaNi:
12,      bi: 12
Vessel i: 2:      pi: 7-12,      ai-di: 8-26,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 8-26,      taoi-deltai: 8-19,      taoPi_SP-deltaPi_SP: 8-19,      betaNi: 11
,      bi: 11
Vessel i: 3:      pi: 5-10,      ai-di: 41-62,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 41-62,      taoi-deltai: 41-53,      taoPi_SP-deltaPi_SP: 41-53,      betaNi
: 12,      bi: 12
Vessel i: 4:      pi: 7-14,      ai-di: 55-82,      gi_SP-gpi_SP: 0.000000-0.000000,      ai_SP-di: 55-82,      taoi-deltai: 55-75,      taoPi_SP-deltaPi_SP: 55-75,      betaNi
: 20,      bi: 20
Vessel i: 5:      pi: 10-15,      ai-di: 18-61,      gi_SP-gpi_SP: 0.000000-1.000000,      ai_SP-di: 18-61,      taoi-deltai: 21-46,      taoPi_SP-deltaPi_SP: 21-46,
betaNi: 25,      bi: 25
Vessel i: 6:      pi: 12-17,      ai-di: 9-39,      gi_SP-gpi_SP: 0.875000-0.400000,      ai_SP-di: 16-39,      taoi-deltai: 11-20,      taoPi_SP-deltaPi_SP: 16-20,      betaNi
: 9,      bi: 9
Vessel i: 7:      pi: 15-21,      ai-di: 35-77,      gi_SP-gpi_SP: 1.000000-0.600000,      ai_SP-di: 45-77,      taoi-deltai: 40-59,      taoPi_SP-deltaPi_SP: 45-59,
betaNi: 19,      bi: 19
Vessel i: 8:      pi: 18-23,      ai-di: 5-41,      gi_SP-gpi_SP: 0.553571-1.000000,      ai_SP-di: 8-41,      taoi-deltai: 12-25,      taoPi_SP-deltaPi_SP: 12-25,      betaNi:
13,      bi: 13
Vessel i: 9:      pi: 15-20,      ai-di: 29-55,      gi_SP-gpi_SP: 0.571429-0.000000,      ai_SP-di: 33-55,      taoi-deltai: 33-39,      taoPi_SP-deltaPi_SP: 33-39,
betaNi: 6,      bi: 6

round LB =   [743, 5604, 6732]
round UB =   [10465, 6730, 6730]
round Hua =   [0, 4861, 5987]
round SPObjVal =   [4861, 5987, 6042]
round MPObjValNHua =   [743, 743, 746]

Time: 1371.000000
```