```
"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=23018

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 546361 rows, 52642 columns and 1529305 nonzeros
Model fingerprint: 0x080f55c9
Variable types: 1 continuous, 52641 integer (52605 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 323914 rows and 24616 columns (presolve time = 5s) ...
Presolve removed 462566 rows and 35488 columns
Presolve time: 8.63s
Presolved: 83795 rows, 17154 columns, 258615 nonzeros
Variable types: 0 continuous, 17154 integer (17127 binary)

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

Root relaxation presolved: 17154 rows, 100949 columns, 275769 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.8000000e+02   0.000000e+00   1.001000e+03      9s
Concurrent spin time: 0.00s

Solved with dual simplex (primal model)

Root relaxation: objective 7.800000e+02, 2393 iterations, 0.35 seconds (0.38 work units)

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

     0     0  780.00000    0   14          -  780.00000      -     -    9s
     0     0  780.00000    0   38          -  780.00000      -     -   10s
H    0     0                1740.0000000  780.00000  55.2%     -   10s
     0     0  780.00000    0    6 1740.00000  780.00000  55.2%     -   11s
     0     0  780.00000    0   36 1740.00000  780.00000  55.2%     -   12s
     0     0  780.00000    0   33 1740.00000  780.00000  55.2%     -   13s
     0     0  780.00000    0   51 1740.00000  780.00000  55.2%     -   13s
     0     0  780.00000    0   88 1740.00000  780.00000  55.2%     -   14s
     0     0  780.00000    0   86 1740.00000  780.00000  55.2%     -   14s
H    0     0                780.0000000  780.00000  0.00%     -   14s
     0     0  780.00000    0    2  780.00000  780.00000  0.00%     -   14s

Cutting planes:
  Cover: 113
  Implied bound: 1178
  Clique: 21
  MIR: 117
  StrongCG: 84
  GUB cover: 6
  Zero half: 7
  Mod-K: 15
  RLT: 18
  Relax-and-lift: 16
  BQP: 3

```

```
Explored 1 nodes (24632 simplex iterations) in 14.91 seconds (27.90 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 780 1740

Optimal solution found (tolerance 1.00e-10)
Best objective 7.800000000000e+02, best bound 7.800000000000e+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 2481516 rows, 1955335 columns and 17235685 nonzeros
Model fingerprint: 0xb0da9aa6
Variable types: 963295 continuous, 992040 integer (985965 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 2478485 rows and 1954208 columns (presolve time = 5s) ...
Presolve removed 2478485 rows and 1954207 columns
Presolve time: 5.21s
Presolved: 3031 rows, 1128 columns, 8112 nonzeros
Variable types: 6 continuous, 1122 integer (664 binary)
Found heuristic solution: objective 3035.0500186
Found heuristic solution: objective 3411.0500186

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    8.9062796e+03   4.419845e+03   0.000000e+00      7s
     900    4.8910500e+03   0.000000e+00   0.000000e+00      7s

Root relaxation: objective 4.891050e+03, 900 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 4891.05002    0   24 3411.05002 4891.05002  43.4%     -    6s
H    0     0                4825.0500186 4891.05002  1.37%     -    6s
*    0     0               0    4891.0500186 4891.05002  0.00%     -    6s

Cutting planes:
  Learned: 1
  Gomory: 3
  Cover: 2
  Implied bound: 7
  Clique: 3
  MIR: 4
  Flow cover: 7
  Zero half: 1
  RLT: 2
  Relax-and-lift: 1

Explored 1 nodes (1364 simplex iterations) in 6.85 seconds (7.31 work units)
Thread count was 8 (of 8 available processors)

Solution count 4: 4891.05 4825.05 3411.05 3035.05

Optimal solution found (tolerance 1.00e-08)
Best objective 4.891050018628e+03, best bound 4.891050018628e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□4891

  Itr = 0
Collect_LB =   [780.0]
Collect_UB =   [10562.10003725563]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [4891.050018627815]
Collect_MPObjValNHua =   [780.0]


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 1090262 rows, 303661 columns and 3235440 nonzeros
Model fingerprint: 0xbe15e602
Variable types: 1 continuous, 303660 integer (292257 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 882742 rows and 279312 columns (presolve time = 5s) ...
Presolve removed 910058 rows and 281966 columns (presolve time = 10s) ...
Presolve removed 989696 rows and 289734 columns
Presolve time: 13.95s
Presolved: 100566 rows, 13927 columns, 312209 nonzeros
Variable types: 1 continuous, 13926 integer (11631 binary)

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

Root relaxation presolved: 13927 rows, 114493 columns, 326136 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.6710500e+03   0.000000e+00   1.498109e+04     15s
    4120    5.6734311e+03   0.000000e+00   1.168913e+06     15s
Concurrent spin time: 0.47s

Solved with dual simplex (primal model)

Root relaxation: objective 5.671050e+03, 6500 iterations, 1.48 seconds (1.78 work units)

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

     0     0 5671.05002    0  328          - 5671.05002      -     -   18s
     0     0 5671.05002    0  803          - 5671.05002      -     -   22s
     0     0 5671.05002    0  738          - 5671.05002      -     -   22s
     0     0 5671.05002    0  735          - 5671.05002      -     -   22s
     0     0 5671.05002    0  988          - 5671.05002      -     -   25s
     0     0 5671.05002    0  975          - 5671.05002      -     -   25s
     0     0 5671.05002    0  298          - 5671.05002      -     -   32s
     0     0 5671.05002    0  291          - 5671.05002      -     -   32s
     0     0 5671.05002    0  366          - 5671.05002      -     -   33s
     0     0 5671.05002    0  289          - 5671.05002      -     -   41s
     0     0 5671.05002    0  271          - 5671.05002      -     -   41s
     0     0 5671.05002    0  308          - 5671.05002      -     -   41s
     0     0 5671.05002    0  180          - 5671.05002      -     -   46s
     0     0 5671.05002    0  185          - 5671.05002      -     -   46s
     0     0 5671.05002    0  154          - 5671.05002      -     -   49s
     0     0 5671.05002    0  228          - 5671.05002      -     -   49s
     0     0 5671.05002    0  180          - 5671.05002      -     -   54s
     0     0 5671.05002    0  176          - 5671.05002      -     -   55s
H    0     0                    5671.0500186 5671.05002  0.00%     -   63s
     0     0 5671.05002    0  176 5671.05002 5671.05002  0.00%     -   63s

Cutting planes:
  Gomory: 5
  Lift-and-project: 1
  Cover: 399
  Implied bound: 359
  Clique: 5276
  MIR: 267
  StrongCG: 127
  Flow cover: 5
  GUB cover: 34
  Zero half: 17
  RLT: 74
  Relax-and-lift: 340
  BQP: 39

Explored 1 nodes (131018 simplex iterations) in 63.41 seconds (168.50 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 5671.05

Optimal solution found (tolerance 5.00e-02)
Best objective 5.671050018628e+03, best bound 5.671050018628e+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 2481516 rows, 1955335 columns and 17235685 nonzeros
Model fingerprint: 0x45240a06
Variable types: 963295 continuous, 992040 integer (985965 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 2476261 rows and 1953584 columns
Presolve time: 4.73s
Presolved: 5255 rows, 1751 columns, 13911 nonzeros
Variable types: 8 continuous, 1743 integer (1002 binary)
Found heuristic solution: objective 3514.0500186

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    1.1657452e+04   5.988458e+03   0.000000e+00      6s
    1579    5.3506703e+03   0.000000e+00   0.000000e+00      6s

Root relaxation: objective 5.350670e+03, 1579 iterations, 0.01 seconds (0.02 work units)

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

     0     0 5350.67026    0   18 3514.05002 5350.67026  52.3%     -    6s
H    0     0                5325.6702574 5350.67026  0.47%     -    6s
H    0     0                5345.6702574 5350.67026  0.09%     -    6s
*    0     0               0    5350.6702574 5350.67026  0.00%     -    6s

Cutting planes:
  Learned: 2
  Gomory: 1
  Implied bound: 7
  MIR: 6
  Flow cover: 4
  Zero half: 1
  RLT: 1
  Relax-and-lift: 2
  BQP: 1

Explored 1 nodes (2407 simplex iterations) in 6.35 seconds (6.91 work units)
Thread count was 8 (of 8 available processors)

Solution count 4: 5350.67 5345.67 5325.67 3514.05

Optimal solution found (tolerance 1.00e-08)
Best objective 5.350670257367e+03, best bound 5.350670257367e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5350

  Itr = 1
Collect_LB =   [780.0, 5671.050018627815]
Collect_UB =   [10562.10003725563, 6130.670257367259]
Collect_Hua =   [0.0, 4891.050018627815]
Collect_SPObjVal =   [4891.050018627815, 5350.670257367259]
Collect_MPObjValNHua =   [780.0, 780.0]


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 1626434 rows, 323344 columns and 4933810 nonzeros
Model fingerprint: 0xd9d0d6a5
Variable types: 1 continuous, 323343 integer (300573 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 1361413 rows and 293461 columns (presolve time = 5s) ...
Presolve removed 1403783 rows and 296603 columns (presolve time = 10s) ...
Presolve removed 1403783 rows and 296603 columns (presolve time = 15s) ...
Presolve removed 1481581 rows and 304349 columns
Presolve time: 19.36s
Presolved: 144853 rows, 18995 columns, 478549 nonzeros
Variable types: 1 continuous, 18994 integer (14511 binary)

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

Root relaxation presolved: 18995 rows, 163848 columns, 497544 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    6.1306703e+03   0.000000e+00   2.636725e+04     21s
   20012    6.1306703e+03   0.000000e+00   0.000000e+00     23s
   20012    6.1306703e+03   0.000000e+00   0.000000e+00     23s
Concurrent spin time: 1.14s

Solved with primal simplex

Root relaxation: objective 6.130670e+03, 20012 iterations, 3.72 seconds (5.34 work units)
Total elapsed time = 27.10s

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

     0     0 6130.67026    0  600          - 6130.67026      -     -   30s
     0     0 6130.67026    0  837          - 6130.67026      -     -   34s
     0     0 6130.67026    0  813          - 6130.67026      -     -   34s
     0     0 6130.67026    0  850          - 6130.67026      -     -   37s
     0     0 6130.67026    0  440          - 6130.67026      -     -   47s
     0     0 6130.67026    0  447          - 6130.67026      -     -   47s
     0     0 6130.67026    0  490          - 6130.67026      -     -   48s
     0     0 6130.67026    0  366          - 6130.67026      -     -   59s
     0     0 6130.67026    0  419          - 6130.67026      -     -   61s
     0     0 6130.67026    0  410          - 6130.67026      -     -   61s
     0     0 6130.67026    0  290          - 6130.67026      -     -   66s
     0     0 6130.67026    0  289          - 6130.67026      -     -   66s
     0     0 6130.67026    0  446          - 6130.67026      -     -   68s
     0     0 6130.67026    0  451          - 6130.67026      -     -   68s
     0     0 6130.67026    0  320          - 6130.67026      -     -   74s
     0     0 6130.67026    0  288          - 6130.67026      -     -   74s
     0     0 6130.67026    0  508          - 6130.67026      -     -   77s
     0     0 6130.67026    0  470          - 6130.67026      -     -   77s
     0     0 6130.67026    0  277          - 6130.67026      -     -   83s
     0     0 6130.67026    0  276          - 6130.67026      -     -   83s
     0     0 6130.67026    0  683          - 6130.67026      -     -   85s
     0     0 6130.67026    0   99          - 6130.67026      -     -   90s
     0     0 6130.67026    0  192          - 6130.67026      -     -   91s
     0     0 6130.67026    0  123          - 6130.67026      -     -   91s
     0     0 6130.67026    0  167          - 6130.67026      -     -   95s
     0     0 6130.67026    0  161          - 6130.67026      -     -   95s
     0     0 6130.67026    0  113          - 6130.67026      -     -   98s
     0     2 6130.67026    0   65          - 6130.67026      -     -  106s
     7    12 6130.67026    3  230          - 6130.67026      -  2587  111s
    19    20 6130.67026    5   84          - 6130.67026      -  1874  117s
    33    27 6130.67026   10   56          - 6130.67026      -  1701  121s
    42    32 6130.67026   13   36          - 6130.67026      -  1803  125s
    66    40 6130.67026   21   77          - 6130.67026      -  1471  131s
    86    45 6130.67026   26  227          - 6130.67026      -  1192  135s
   132    61 infeasible   35               - 6130.67026      -   953  140s
   201   103 infeasible   52               - 6130.67026      -   771  147s
*  217   103              61    6130.6702574 6130.67026  0.00%   717  147s

Cutting planes:
  Learned: 14
  Gomory: 5
  Cover: 530
  Implied bound: 914
  Clique: 8878
  MIR: 533
  StrongCG: 44
  Flow cover: 19
  GUB cover: 481
  Zero half: 27
  Network: 3
  RLT: 144
  Relax-and-lift: 925
  BQP: 90
```

```
  PSD: 1

Explored 275 nodes (383790 simplex iterations) in 147.79 seconds (414.25 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 6130.67

Optimal solution found (tolerance 5.00e-02)
Best objective 6.130670257367e+03, best bound 6.130670257367e+03, gap 0.0000%
Warning: linear constraint 554091 and linear constraint 1090263 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 2481516 rows, 1955335 columns and 17235685 nonzeros
Model fingerprint: 0x0c9b99c3
Variable types: 963295 continuous, 992040 integer (985965 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 2475218 rows and 1953375 columns
Presolve time: 4.85s
Presolved: 6298 rows, 1960 columns, 16685 nonzeros
Variable types: 8 continuous, 1952 integer (1110 binary)

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    1.2273581e+04   9.557802e+03   0.000000e+00      6s
    1690    5.3894515e+03   0.000000e+00   0.000000e+00      6s

Root relaxation: objective 5.389451e+03, 1690 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               0    5389.4514539 5389.45145  0.00%     -    6s

Explored 1 nodes (2418 simplex iterations) in 6.39 seconds (7.14 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 5389.45

Optimal solution found (tolerance 1.00e-08)
Best objective 5.389451453897e+03, best bound 5.389451453897e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5389

  Itr = 2
Collect_LB =   [780.0, 5671.050018627815, 6130.670257367259]
Collect_UB =   [10562.10003725563, 6130.670257367259, 6130.670257367259]
Collect_Hua =   [0.0, 4891.050018627815, 5350.670257367259]
Collect_SPObjVal =   [4891.050018627815, 5350.670257367259, 5389.451453896585]
Collect_MPObjValNHua =   [780.0, 780.0, 780.0]


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

~~~~~~~~~~judge = 2, SPObj_SPF = 5389.451453896585
Vessel i: 0:     pi: 14-19,     ai-di: 13-26,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 13-26,     taoi-deltai: 13-22,     taoPi_SP-deltaPi_SP: 13-22,
    betaNi: 9,     bi: 9
Vessel i: 1:     pi: 8-14,     ai-di: 7-21,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 7-21,     taoi-deltai: 7-17,     taoPi_SP-deltaPi_SP: 7-17,     betaNi: 10
    ,     bi: 10
Vessel i: 2:     pi: 9-14,     ai-di: 19-34,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 19-34,     taoi-deltai: 19-30,     taoPi_SP-deltaPi_SP: 19-30,     betaNi
    : 11,     bi: 11
Vessel i: 3:     pi: 7-13,     ai-di: 31-42,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 31-42,     taoi-deltai: 31-38,     taoPi_SP-deltaPi_SP: 31-38,     betaNi
    : 7,     bi: 7
Vessel i: 4:     pi: 7-14,     ai-di: 39-78,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 39-78,     taoi-deltai: 39-73,     taoPi_SP-deltaPi_SP: 39-73,     betaNi
    : 34,     bi: 34
Vessel i: 5:     pi: 28-34,     ai-di: 14-42,     gi_SP-gpi_SP: 0.000000-0.600000,     ai_SP-di: 14-42,     taoi-deltai: 14-24,     taoPi_SP-deltaPi_SP: 14-24,
    betaNi: 10,     bi: 10
Vessel i: 6:     pi: 14-21,     ai-di: 17-74,     gi_SP-gpi_SP: 1.000000-0.000000,     ai_SP-di: 25-74,     taoi-deltai: 25-55,     taoPi_SP-deltaPi_SP: 25-55,
    betaNi: 30,     bi: 30
Vessel i: 7:     pi: 22-27,     ai-di: 35-62,     gi_SP-gpi_SP: 0.800000-0.800000,     ai_SP-di: 43-62,     taoi-deltai: 39-46,     taoPi_SP-deltaPi_SP: 43-46,
    betaNi: 7,     bi: 7
```

Vessel i: 8: pi: 16-21, ai-di: 51-79, gi_SP-gpi_SP: 0.600000-1.000000, ai_SP-di: 55-79, taoi-deltai: 58-65, taoPi_SP-deltaPi_SP: 58-65, betaNi: 7, bi: 7

round LB = [780, 5671, 6131]
round UB = [10562, 6131, 6131]
round Hua = [0, 4891, 5351]
round SPObjVal = [4891, 5351, 5389]
round MPObjValNHua = [780, 780, 780]

Time: 693.000000