```
"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=39033

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 554430 rows, 52642 columns and 1554628 nonzeros
Model fingerprint: 0xf37ad2f3
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 330690 rows and 25098 columns (presolve time = 5s) ...
Presolve removed 462236 rows and 35319 columns
Presolve time: 9.05s
Presolved: 92194 rows, 17323 columns, 283394 nonzeros
Variable types: 0 continuous, 17323 integer (17301 binary)

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

Root relaxation presolved: 17323 rows, 109517 columns, 300717 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    8.0300000e+02   0.000000e+00   1.021000e+03     10s
Concurrent spin time: 0.01s

Solved with dual simplex (primal model)

Root relaxation: objective 8.030000e+02, 2084 iterations, 0.42 seconds (0.36 work units)
Total elapsed time = 10.06s

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

     0     0  803.00000    0   16          -  803.00000      -     -   10s
H    0     0                3583.0000000  803.00000  77.6%     -   10s
     0     0  803.00000    0   43 3583.00000  803.00000  77.6%     -   11s
H    0     0                2123.0000000  803.00000  62.2%     -   11s
     0     0  803.00000    0  176 2123.00000  803.00000  62.2%     -   12s
     0     0  803.00000    0  168 2123.00000  803.00000  62.2%     -   12s
     0     0  803.00000    0   14 2123.00000  803.00000  62.2%     -   14s
     0     0  803.00000    0   14 2123.00000  803.00000  62.2%     -   14s
     0     0  803.00000    0   32 2123.00000  803.00000  62.2%     -   15s
H    0     0                1003.0000000  803.00000  19.9%     -   15s
     0     0  803.00000    0   28 1003.00000  803.00000  19.9%     -   15s
     0     0  803.00000    0   27 1003.00000  803.00000  19.9%     -   16s
     0     0  803.00000    0   14 1003.00000  803.00000  19.9%     -   16s
     0     0  803.00000    0   85 1003.00000  803.00000  19.9%     -   17s
     0     0  803.00000    0   74 1003.00000  803.00000  19.9%     -   17s
     0     0  803.00000    0   16 1003.00000  803.00000  19.9%     -   18s
     0     0  803.00000    0   16 1003.00000  803.00000  19.9%     -   18s
     0     0  803.00000    0    7 1003.00000  803.00000  19.9%     -   25s
     0     0  803.00000    0   63 1003.00000  803.00000  19.9%     -   26s
H    0     0                803.0000000  803.00000  0.00%     -   26s
     0     0  803.00000    0   88  803.00000  803.00000  0.00%     -   26s

Cutting planes:
  Gomory: 1
```

```
  Cover: 77
  Implied bound: 1
  MIR: 7
  StrongCG: 4
  GUB cover: 26
  RLT: 2
  Relax-and-lift: 24
  BQP: 1

Explored 1 nodes (25603 simplex iterations) in 26.80 seconds (46.24 work units)
Thread count was 8 (of 8 available processors)

Solution count 4: 803 1003 2123 3583

Optimal solution found (tolerance 1.00e-10)
Best objective 8.030000000000e+02, best bound 8.030000000000e+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 2481701 rows, 1955335 columns and 17236208 nonzeros
Model fingerprint: 0x1e50b9ec
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 2479011 rows and 1954367 columns (presolve time = 5s) ...
Presolve removed 2479389 rows and 1954500 columns
Presolve time: 5.98s
Presolved: 2312 rows, 835 columns, 6149 nonzeros
Variable types: 5 continuous, 830 integer (502 binary)
Found heuristic solution: objective 3536.0500186

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.9982796e+03   2.982021e+03   0.000000e+00      7s
     699    4.3290500e+03   0.000000e+00   0.000000e+00      7s

Root relaxation: objective 4.329050e+03, 699 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

H    0     0                    4329.0500186 8215.74099  89.8%     -    7s
     0     0        -    0      4329.05002 4329.05002  0.00%     -    7s

Explored 1 nodes (979 simplex iterations) in 7.75 seconds (7.88 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 4329.05 3536.05

Optimal solution found (tolerance 1.00e-08)
Best objective 4.329050018628e+03, best bound 4.329050018628e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□4329

  Itr = 0
Collect_LB =   [803.0]
Collect_UB =   [9461.100037255623]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [4329.050018627811]
Collect_MPObjValNHua =   [803.0]


Set parameter TimeLimit to value 12000
Set parameter MIPGap to value 0.0005
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 563248 rows, 283978 columns and 1563500 nonzeros
Model fingerprint: 0x52047408
Variable types: 1 continuous, 283977 integer (283941 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 404286 rows and 266303 columns (presolve time = 5s) ...
Presolve removed 537987 rows and 276495 columns
Presolve time: 8.39s
Presolved: 25261 rows, 7483 columns, 100784 nonzeros
Variable types: 0 continuous, 7483 integer (7461 binary)

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.1320500e+03   8.890000e+02   0.000000e+00      9s
    4703    5.1320500e+03   0.000000e+00   0.000000e+00      9s

Root relaxation: objective 5.132050e+03, 4703 iterations, 0.17 seconds (0.23 work units)

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

     0     0 5132.05002    0   36          - 5132.05002      -     -    9s
     0     0 5132.05002    0  134          - 5132.05002      -     -   10s
     0     0 5132.05002    0  132          - 5132.05002      -     -   10s
     0     0 5132.05002    0  448          - 5132.05002      -     -   11s
     0     0 5132.05002    0  418          - 5132.05002      -     -   11s
     0     0 5132.05002    0  454          - 5132.05002      -     -   11s
     0     0 5132.05002    0  156          - 5132.05002      -     -   14s
     0     0 5132.05002    0  565          - 5132.05002      -     -   15s
     0     0 5132.05002    0  507          - 5132.05002      -     -   15s
     0     0 5132.05002    0  303          - 5132.05002      -     -   19s
     0     0 5132.05002    0  297          - 5132.05002      -     -   19s
     0     0 5132.05002    0  514          - 5132.05002      -     -   21s
     0     0 5132.05002    0  340          - 5132.05002      -     -   27s
H    0     0                 7652.0500186 5132.05002  32.9%     -   28s
     0     0 5132.05002    0  303 7652.05002 5132.05002  32.9%     -   29s
H    0     0                 7052.0500186 5132.05002  27.2%     -   30s
H    0     0                 6972.0500186 5132.05002  26.4%     -   30s
H    0     0                 6572.0500186 5132.05002  21.9%     -   30s
     0     2 5132.05002    0  303 6572.05002 5132.05002  21.9%     -   31s
     3     8 5132.05002    2  493 6572.05002 5132.05002  21.9%  7035   35s
    15    20 5134.13314    4 1219 6572.05002 5132.05002  21.9%  5430   42s
    23    29 5132.05002    5  704 6572.05002 5132.05002  21.9%  4692   45s
    57    43 infeasible    9      6572.05002 5132.05002  21.9%  2834   52s
    84    72 5142.74236   12 1073 6572.05002 5132.05002  21.9%  2650   56s
   185   196 5492.05002   24  366 6572.05002 5132.05002  21.9%  1533   60s
H  225   234                 5932.0500186 5132.05002  13.5%  1272   60s
H  391   264                 5852.0500186 5132.05002  12.3%   758   62s
   528   392 5150.86988    8 1944 5852.05002 5132.05002  12.3%   613   65s
H  592   228                 5412.0500186 5132.05002  5.17%   584   67s
   599   240 5141.30069   12  753 5412.05002 5132.05002  5.17%   609   70s
   763   215 5152.05002   44  610 5412.05002 5132.05002  5.17%   563   75s
H  807   229                 5332.0500186 5132.05002  3.75%   591   77s
   821   238 5152.05002   52  608 5332.05002 5132.05002  3.75%   609   80s
   888   154 5152.05002   55  303 5332.05002 5132.05002  3.75%   624   91s
   894   158 5302.05002    5  646 5332.05002 5175.18834  2.94%   620   95s
   901   163 5272.05002    7  557 5332.05002 5192.05002  2.63%   615  100s
H  905   156                 5232.0500186 5192.05002  0.76%   612  104s

Cutting planes:
  Learned: 1
  Gomory: 27
  Cover: 426
  Implied bound: 40
  Projected implied bound: 43
  Clique: 68
  MIR: 98
  StrongCG: 34
  Flow cover: 231
  GUB cover: 53
  Zero half: 92
  RLT: 13
  Relax-and-lift: 115
  BQP: 2

Explored 906 nodes (712058 simplex iterations) in 104.99 seconds (234.58 work units)
Thread count was 8 (of 8 available processors)

Solution count 9: 5232.05 5332.05 5412.05 ... 7652.05
```

```
Optimal solution found (tolerance 5.00e-04)
Best objective 5.232050018628e+03, best bound 5.232050018628e+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 2481701 rows, 1955335 columns and 17236208 nonzeros
Model fingerprint: 0x9ac0419f
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 2476584 rows and 1953678 columns (presolve time = 5s) ...
Presolve removed 2476913 rows and 1953807 columns
Presolve time: 5.16s
Presolved: 4788 rows, 1528 columns, 12871 nonzeros
Variable types: 8 continuous, 1520 integer (882 binary)
Found heuristic solution: objective 3697.0500186

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    9.3735808e+03   3.644842e+03   0.000000e+00      7s
    1353    5.2855807e+03   0.000000e+00   0.000000e+00      7s

Root relaxation: objective 5.285581e+03, 1353 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

H    0     0                    5285.5807430 13966.7410   164%     -    6s
     0     0          -    0     5285.58074 5285.58074  0.00%     -    6s

Explored 1 nodes (2074 simplex iterations) in 6.83 seconds (7.05 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 5285.58 3697.05

Optimal solution found (tolerance 1.00e-08)
Best objective 5.285580742960e+03, best bound 5.285580742960e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5285

 Itr = 1
Collect_LB =   [803.0, 5232.050018627811]
Collect_UB =   [9461.100037255623, 6188.580742959544]
Collect_Hua =   [0.0, 4329.050018627811]
Collect_SPObjVal =   [4329.050018627811, 5285.580742959544]
Collect_MPObjValNHua =   [803.0, 903.0]


Set parameter TimeLimit to value 12000
Set parameter MIPGap to value 0.0005
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 563249 rows, 283978 columns and 1563519 nonzeros
Model fingerprint: 0x11d1c01e
Variable types: 1 continuous, 283977 integer (283941 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 413430 rows and 267080 columns (presolve time = 5s) ...
Presolve removed 539041 rows and 276661 columns
Presolve time: 7.76s
Presolved: 24208 rows, 7317 columns, 96550 nonzeros
Variable types: 0 continuous, 7317 integer (7295 binary)

```

```
Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    6.1071522e+03   8.840000e+02   0.000000e+00      8s
    3521    6.1071522e+03   0.000000e+00   0.000000e+00      8s

Root relaxation: objective 6.107152e+03, 3521 iterations, 0.08 seconds (0.10 work units)

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

     0     0 6107.15217    0   34          - 6107.15217      -     -    8s
     0     0 6107.15217    0  136          - 6107.15217      -     -    9s
     0     0 6107.15217    0  147          - 6107.15217      -     -    9s
     0     0 6107.15217    0  127          - 6107.15217      -     -    9s
     0     0 6107.15217    0  264          - 6107.15217      -     -    9s
     0     0 6107.15217    0  258          - 6107.15217      -     -    9s
     0     0 6107.15217    0  226          - 6107.15217      -     -   10s
     0     0 6107.15217    0  224          - 6107.15217      -     -   10s
     0     0 6107.15217    0  427          - 6107.15217      -     -   11s
     0     0 6107.15217    0  458          - 6107.15217      -     -   11s
     0     0 6107.15217    0  198          - 6107.15217      -     -   14s
     0     0 6107.15217    0  244          - 6107.15217      -     -   15s
     0     0 6107.15217    0  220          - 6107.15217      -     -   15s
     0     0 6107.15217    0  284          - 6107.15217      -     -   15s
     0     0 6107.15217    0  264          - 6107.15217      -     -   15s
     0     0 6107.15217    0  113          - 6107.15217      -     -   17s
H    0     0                 8827.1521715 6107.15217  30.8%    -   17s
     0     0 6107.15217    0   67 8827.15217 6107.15217  30.8%    -   17s
H    0     0                 7087.1521715 6107.15217  13.8%    -   18s
H    0     0                 6707.1521715 6107.15217  8.95%    -   19s
     0     2 6107.15217    0   67 6707.15217 6107.15217  8.95%    -   19s
     7    10 6107.15217    3  149 6707.15217 6107.15217  8.95%  1245   20s
    50    47 6107.15217   11  205 6707.15217 6107.15217  8.95%  1304   25s
H   69    65                6567.1521715 6107.15217  7.00%  1251   26s
H  117   100                 6367.1521715 6107.15217  4.08%   930   28s
   174   121 6107.15217   31  249 6367.15217 6107.15217  4.08%   794   30s
H  368   214                 6307.1521715 6107.15217  3.17%   523   33s
H  529   255                 6267.1521715 6107.15217  2.55%   439   34s
   552   264 6107.15217   61  311 6267.15217 6107.15217  2.55%   422   35s
H  557   264                 6247.1521715 6107.15217  2.24%   420   35s
H  562   264                 6207.1521715 6107.15217  1.61%   417   35s
H  642   275                 6167.1521715 6107.15217  0.97%   372   35s
  1003    75 6107.15217   18  565 6167.15217 6107.15217  0.97%   288   40s
H 1016    75                 6127.1521715 6107.15217  0.33%   285   40s

Explored 1120 nodes (365288 simplex iterations) in 41.75 seconds (85.45 work units)
Thread count was 8 (of 8 available processors)

Solution count 10: 6127.15 6167.15 6207.15 ... 7087.15

Optimal solution found (tolerance 5.00e-04)
Best objective 6.127152171531e+03, best bound 6.127152171531e+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 2481701 rows, 1955335 columns and 17236208 nonzeros
Model fingerprint: 0x23d88fe7
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 2476869 rows and 1953786 columns (presolve time = 5s) ...
Presolve removed 2476901 rows and 1953806 columns
Presolve time: 5.17s
Presolved: 4800 rows, 1529 columns, 12833 nonzeros
Variable types: 8 continuous, 1521 integer (884 binary)
Found heuristic solution: objective 3487.2950287

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    9.0775808e+03   3.707917e+03   0.000000e+00      7s
    1505    5.0582241e+03   0.000000e+00   0.000000e+00      7s
```

```
Root relaxation: objective 5.058224e+03, 1505 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 5058.22411    0   22 3487.29503 5058.22411  45.0%     -    6s
H    0     0                    5057.8528892 5058.22411  0.01%     -    6s

Cutting planes:
  Gomory: 1
  Clique: 2
  MIR: 3
  Flow cover: 1
  Zero half: 1

Explored 1 nodes (2015 simplex iterations) in 6.85 seconds (7.46 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 5057.85 3487.3

Optimal solution found (tolerance 1.00e-08)
Best objective 5.057852889165e+03, best bound 5.057852889165e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5057

 Itr = 2
Collect_LB =   [803.0, 5232.050018627811, 6127.152171530973]
Collect_UB =   [9461.100037255623, 6188.580742959544, 5899.424317736787]
Collect_Hua =   [0.0, 4329.050018627811, 5285.580742959544]
Collect_SPObjVal =   [4329.050018627811, 5285.580742959544, 5057.852889165359]
Collect_MPObjValNHua =   [803.0, 903.0, 841.5714285714284]


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

~~~~~~~~~~judgeCount = 1, SPObj_SPF = 5285.580742959544
Vessel i: 0:     pi: 0-6,     ai-di: 70-81,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 70-81,     taoi-deltai: 70-81,     taoPi_SP-deltaPi_SP: 70-81,     betaNi:
11,     bi: 11
Vessel i: 1:     pi: 0-6,     ai-di: 13-31,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 13-31,     taoi-deltai: 13-31,     taoPi_SP-deltaPi_SP: 13-31,     betaNi:
18,     bi: 18
Vessel i: 2:     pi: 6-13,     ai-di: 27-50,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 27-50,     taoi-deltai: 27-50,     taoPi_SP-deltaPi_SP: 27-50,     betaNi
: 23,     bi: 23
Vessel i: 3:     pi: 13-20,     ai-di: 25-49,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 25-49,     taoi-deltai: 25-49,     taoPi_SP-deltaPi_SP: 25-49,
betaNi: 24,     bi: 24
Vessel i: 4:     pi: 20-26,     ai-di: 31-37,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 31-37,     taoi-deltai: 31-37,     taoPi_SP-deltaPi_SP: 31-37,
betaNi: 6,     bi: 6
Vessel i: 5:     pi: 28-34,     ai-di: 16-38,     gi_SP-gpi_SP: 0.214286-0.700000,     ai_SP-di: 17-38,     taoi-deltai: 21-32,     taoPi_SP-deltaPi_SP: 21-32,
betaNi: 11,     bi: 11
Vessel i: 6:     pi: 14-19,     ai-di: 6-24,     gi_SP-gpi_SP: 1.000000-0.000000,     ai_SP-di: 14-24,     taoi-deltai: 10-16,     taoPi_SP-deltaPi_SP: 14-16,     betaNi
: 6,     bi: 6
Vessel i: 7:     pi: 27-34,     ai-di: 30-49,     gi_SP-gpi_SP: 0.900000-0.700000,     ai_SP-di: 39-49,     taoi-deltai: 36-41,     taoPi_SP-deltaPi_SP: 39-41,
betaNi: 5,     bi: 5
Vessel i: 8:     pi: 27-34,     ai-di: 40-73,     gi_SP-gpi_SP: 0.285714-1.000000,     ai_SP-di: 42-73,     taoi-deltai: 42-61,     taoPi_SP-deltaPi_SP: 42-61,
betaNi: 19,     bi: 19

round LB =   [803, 5232, 6127]
round UB =   [9461, 6189, 5899]
round Hua =   [0, 4329, 5286]
round SPObjVal =   [4329, 5286, 5058]
round MPObjValNHua =   [803, 903, 842]

OptimalObj = 6127.152171530973
Time: 636.000000
```