```
"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=39158

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_TWS.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: 7.82s
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      8s
Concurrent spin time: 0.02s

Solved with dual simplex (primal model)

Root relaxation: objective 8.030000e+02, 2084 iterations, 0.33 seconds (0.36 work units)

    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      -     -    8s
H    0     0                    3583.0000000  803.00000  77.6%     -    9s
     0     0  803.00000    0   43 3583.00000  803.00000  77.6%     -    9s
H    0     0                    2123.0000000  803.00000  62.2%     -   10s
     0     0  803.00000    0  176 2123.00000  803.00000  62.2%     -   10s
     0     0  803.00000    0  168 2123.00000  803.00000  62.2%     -   10s
     0     0  803.00000    0   14 2123.00000  803.00000  62.2%     -   12s
     0     0  803.00000    0   14 2123.00000  803.00000  62.2%     -   12s
     0     0  803.00000    0   32 2123.00000  803.00000  62.2%     -   13s
H    0     0                    1003.0000000  803.00000  19.9%     -   13s
     0     0  803.00000    0   28 1003.00000  803.00000  19.9%     -   13s
     0     0  803.00000    0   27 1003.00000  803.00000  19.9%     -   14s
     0     0  803.00000    0   14 1003.00000  803.00000  19.9%     -   14s
     0     0  803.00000    0   85 1003.00000  803.00000  19.9%     -   15s
     0     0  803.00000    0   74 1003.00000  803.00000  19.9%     -   15s
     0     0  803.00000    0   16 1003.00000  803.00000  19.9%     -   16s
     0     0  803.00000    0   16 1003.00000  803.00000  19.9%     -   16s
     0     0  803.00000    0    7 1003.00000  803.00000  19.9%     -   23s
     0     0  803.00000    0   63 1003.00000  803.00000  19.9%     -   23s
H    0     0                    803.0000000  803.00000  0.00%     -   23s
     0     0  803.00000    0   88  803.00000  803.00000  0.00%     -   24s

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 24.04 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 536186 rows, 14427 columns and 1098485 nonzeros
Model fingerprint: 0xf8c80c4a
Variable types: 36 continuous, 14391 integer (8316 binary)
Coefficient statistics:
  Matrix range     [1e-01, 1e+10]
  Objective range  [6e-05, 5e+01]
  Bounds range     [1e+00, 1e+00]
  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 533874 rows and 13592 columns
Presolve time: 0.38s
Presolved: 2312 rows, 835 columns, 6149 nonzeros
Variable types: 5 continuous, 830 integer (502 binary)
Found heuristic solution: objective 3536.0500186

Root relaxation: objective 4.329050e+03, 655 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

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

Explored 1 nodes (967 simplex iterations) in 0.52 seconds (0.77 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 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 563247 rows, 283978 columns and 1563481 nonzeros
Model fingerprint: 0x92045efc
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 404285 rows and 266303 columns (presolve time = 5s) ...
```

```
Presolve removed 537986 rows and 276495 columns
Presolve time: 7.49s
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      8s
    4703    5.1320500e+03   0.000000e+00   0.000000e+00      8s

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      -     -    8s
     0     0 5132.05002    0  134          - 5132.05002      -     -    8s
     0     0 5132.05002    0  132          - 5132.05002      -     -    9s
     0     0 5132.05002    0  448          - 5132.05002      -     -    9s
     0     0 5132.05002    0  418          - 5132.05002      -     -    9s
     0     0 5132.05002    0  454          - 5132.05002      -     -   10s
     0     0 5132.05002    0  156          - 5132.05002      -     -   12s
     0     0 5132.05002    0  565          - 5132.05002      -     -   13s
     0     0 5132.05002    0  507          - 5132.05002      -     -   13s
     0     0 5132.05002    0  303          - 5132.05002      -     -   17s
     0     0 5132.05002    0  297          - 5132.05002      -     -   17s
     0     0 5132.05002    0  514          - 5132.05002      -     -   19s
     0     0 5132.05002    0  340          - 5132.05002      -     -   24s
H    0     0                 7652.0500186 5132.05002  32.9%     -   25s
     0     0 5132.05002    0  303 7652.05002 5132.05002  32.9%     -   26s
H    0     0                 7052.0500186 5132.05002  27.2%     -   27s
H    0     0                 6972.0500186 5132.05002  26.4%     -   27s
H    0     0                 6572.0500186 5132.05002  21.9%     -   27s
     0     2 5132.05002    0  303 6572.05002 5132.05002  21.9%     -   28s
     3     8 5132.05002    2  493 6572.05002 5132.05002  21.9%  7035   31s
    15    20 5134.13314    4 1219 6572.05002 5132.05002  21.9%  5430   35s
    28    34 5132.05002    6  663 6572.05002 5132.05002  21.9%  4266   40s
    63    52 5133.55107    9 1138 6572.05002 5132.05002  21.9%  2841   45s
   130   129 5251.57943   16  874 6572.05002 5132.05002  21.9%  2108   50s
H  225   234                 5932.0500186 5132.05002  13.5%  1272   52s
H  391   264                 5852.0500186 5132.05002  12.3%   758   53s
   445   332 5612.05002  112  151 5852.05002 5132.05002  12.3%   679   55s
H  592   228                 5412.0500186 5132.05002  5.17%   584   58s
   599   240 5141.30069   12  753 5412.05002 5132.05002  5.17%   609   60s
   763   215 5152.05002   44  610 5412.05002 5132.05002  5.17%   563   65s
H  807   229                 5332.0500186 5132.05002  3.75%   591   67s
   821   238 5152.05002   52  608 5332.05002 5132.05002  3.75%   609   70s
   888   154 5152.05002   55  303 5332.05002 5132.05002  3.75%   624   81s
   894   158 5302.05002    5  646 5332.05002 5175.18834  2.94%   620   85s
   900   162 5192.05002    6  471 5332.05002 5192.05002  2.63%   616   90s
H  905   156                 5232.0500186 5192.05002  0.76%   612   94s

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 95.05 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 1.00e-10)
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 536186 rows, 14427 columns and 1098485 nonzeros
Model fingerprint: 0xc35efe82
```

```
Variable types: 36 continuous, 14391 integer (8316 binary)
Coefficient statistics:
  Matrix range     [1e-01, 1e+10]
  Objective range  [6e-05, 5e+01]
  Bounds range     [1e+00, 1e+00]
  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 531398 rows and 12899 columns
Presolve time: 0.38s
Presolved: 4788 rows, 1528 columns, 12871 nonzeros
Variable types: 8 continuous, 1520 integer (882 binary)
Found heuristic solution: objective 3697.0500186

Root relaxation: objective 5.285581e+03, 1398 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 5285.58074    0   11 3697.05002 5285.58074  43.0%     -    0s
H    0     0                4376.5807430 5285.58074  20.8%     -    0s
H    0     0                5285.5807430 5285.58074  0.00%     -    0s
     0     0 5285.58074    0   11 5285.58074 5285.58074  0.00%     -    0s

Explored 1 nodes (1896 simplex iterations) in 0.58 seconds (0.80 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 5285.58 4376.58 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 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 563247 rows, 283978 columns and 1563481 nonzeros
Model fingerprint: 0xfa7b8115
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 413428 rows and 267080 columns (presolve time = 5s) ...
Presolve removed 539039 rows and 276661 columns
Presolve time: 7.74s
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      -     -   11s
     0     0 6107.15217    0  224          - 6107.15217      -     -   11s
     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      -     -   15s
     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      -     -   16s
     0     0 6107.15217    0  264          - 6107.15217      -     -   16s
     0     0 6107.15217    0  113          - 6107.15217      -     -   18s
H    0     0                 8827.1521715 6107.15217  30.8%     -   18s
     0     0 6107.15217    0   67 8827.15217 6107.15217  30.8%     -   18s
H    0     0                 7087.1521715 6107.15217  13.8%     -   19s
H    0     0                 6707.1521715 6107.15217  8.95%     -   20s
     0     2 6107.15217    0   67 6707.15217 6107.15217  8.95%     -   20s
    36    34 6107.15217    9  234 6707.15217 6107.15217  8.95%  1604   25s
H   69    65                 6567.1521715 6107.15217  7.00%  1251   28s
H  117   100                 6367.1521715 6107.15217  4.08%   930   29s
   131   105 6107.15217   27  309 6367.15217 6107.15217  4.08%   885   30s
H  368   214                 6307.1521715 6107.15217  3.17%   523   34s
   388   236 6107.15217   51  450 6307.15217 6107.15217  3.17%   543   35s
H  529   255                 6267.1521715 6107.15217  2.55%   439   36s
H  557   264                 6247.1521715 6107.15217  2.24%   420   36s
H  562   264                 6207.1521715 6107.15217  1.61%   417   36s
H  642   275                 6167.1521715 6107.15217  0.97%   372   37s
   959     3 6107.15217    9  187 6167.15217 6107.15217  0.97%   278   40s
H 1016    75                 6127.1521715 6107.15217  0.33%   285   41s

Explored 1120 nodes (365288 simplex iterations) in 43.22 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 1.00e-10)
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 536186 rows, 14427 columns and 1098485 nonzeros
Model fingerprint: 0xb8512909
Variable types: 36 continuous, 14391 integer (8316 binary)
Coefficient statistics:
  Matrix range     [1e-01, 1e+10]
  Objective range  [6e-05, 5e+01]
  Bounds range     [1e+00, 1e+00]
  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 531386 rows and 12898 columns
Presolve time: 0.38s
Presolved: 4800 rows, 1529 columns, 12833 nonzeros
Variable types: 8 continuous, 1521 integer (884 binary)
Found heuristic solution: objective 3487.2950287

Root relaxation: objective 5.058224e+03, 1535 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 5058.22411    0   10 3487.29503 5058.22411  45.0%     -    0s
H    0     0                 5057.8528892 5058.22411  0.01%     -    0s

Cutting planes:
  MIR: 1

Explored 1 nodes (2120 simplex iterations) in 0.58 seconds (0.84 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, 5899.424317736783]
```

```
Collect_Hua =   [0.0, 4329.050018627811, 5285.580742959544]
Collect_SPObjVal =   [4329.050018627811, 5285.580742959544, 5057.852889165355]
Collect_MPObjValNHua =   [803.0, 903.0, 841.5714285714284]


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

~~~~~~~~~~judge = 2, SPObj_SPF = 5057.852889165355
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: 70-75,    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: 21-27,    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: 20-26,    ai-di: 16-38,    gi_SP-gpi_SP: 0.000000-0.800000,    ai_SP-di: 16-38,    taoi-deltai: 18-29,    taoPi_SP-deltaPi_SP: 18-29,    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: 14-20,    taoPi_SP-deltaPi_SP: 14-20,    betaNi: 6,    bi: 6
Vessel i: 7:    pi: 27-34,    ai-di: 30-49,    gi_SP-gpi_SP: 1.000000-0.600000,    ai_SP-di: 40-49,    taoi-deltai: 39-44,    taoPi_SP-deltaPi_SP: 40-44,    betaNi: 5,    bi: 5
Vessel i: 8:    pi: 20-27,    ai-di: 40-73,    gi_SP-gpi_SP: 0.400000-1.000000,    ai_SP-di: 42-73,    taoi-deltai: 43-62,    taoPi_SP-deltaPi_SP: 43-62,    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: 230.000000
```