```
"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=39205

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 545514 rows, 52642 columns and 1523914 nonzeros
Model fingerprint: 0x36f8316c
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 250782 rows and 16421 columns (presolve time = 5s) ...
Presolve removed 250782 rows and 16421 columns (presolve time = 10s) ...
Presolve removed 445934 rows and 32558 columns
Presolve time: 13.81s
Presolved: 99580 rows, 20084 columns, 308743 nonzeros
Variable types: 0 continuous, 20084 integer (20057 binary)

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

Root relaxation presolved: 20084 rows, 119664 columns, 328827 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.1200000e+02   0.000000e+00   9.770000e+02     15s
Concurrent spin time: 0.01s

Solved with dual simplex (primal model)

Root relaxation: objective 7.120000e+02, 2890 iterations, 0.49 seconds (0.48 work units)
Total elapsed time = 15.39s

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

     0     0  712.00000    0    6          -  712.00000      -     -   15s
H    0     0                7012.0000000  712.00000  89.8%     -   15s
H    0     0                6572.0000000  712.00000  89.2%     -   15s
     0     0  712.00000    0  125 6572.00000  712.00000  89.2%     -   16s
     0     0  712.00000    0  112 6572.00000  712.00000  89.2%     -   16s
H    0     0                4992.0000000  712.00000  85.7%     -   16s
H    0     0                3392.0000000  712.00000  79.0%     -   16s
     0     0  712.00000    0  112 3392.00000  712.00000  79.0%     -   16s
     0     0  712.00000    0    6 3392.00000  712.00000  79.0%     -   17s
H    0     0                1132.0000000  712.00000  37.1%     -   18s
     0     0  712.00000    0   22 1132.00000  712.00000  37.1%     -   18s
     0     0  712.00000    0   10 1132.00000  712.00000  37.1%     -   24s
H    0     0                1012.0000000  712.00000  29.6%     -   24s
     0     0  712.00000    0   79 1012.00000  712.00000  29.6%     -   24s
H    0     0                 772.0000000  712.00000  7.77%     -   24s
     0     0  712.00000    0   80  772.00000  712.00000  7.77%     -   24s
     0     0  712.00000    0  183  772.00000  712.00000  7.77%     -   25s
     0     0  712.00000    0   26  772.00000  712.00000  7.77%     -   27s
H    0     0                 732.0000000  712.00000  2.73%     -   27s
H    0     0                 712.0000000  712.00000  0.00%     -   28s
     0     0  712.00000    0  250  712.00000  712.00000  0.00%     -   28s

Cutting planes:
```

```
  Gomory: 1
  Cover: 23
  Implied bound: 442
  Clique: 2
  MIR: 13
  StrongCG: 8
  Flow cover: 3
  GUB cover: 5
  RLT: 19
  Relax-and-lift: 2

Explored 1 nodes (25193 simplex iterations) in 28.31 seconds (46.88 work units)
Thread count was 8 (of 8 available processors)

Solution count 9: 712 732 772 ... 7012

Optimal solution found (tolerance 1.00e-10)
Best objective 7.120000000000e+02, best bound 7.120000000000e+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 2481762 rows, 1955335 columns and 17236452 nonzeros
Model fingerprint: 0xe5f662ad
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 2477808 rows and 1953996 columns (presolve time = 5s) ...
Presolve removed 2478884 rows and 1954390 columns
Presolve time: 5.36s
Presolved: 2878 rows, 945 columns, 7637 nonzeros
Variable types: 8 continuous, 937 integer (551 binary)
Found heuristic solution: objective 3593.0500186
Found heuristic solution: objective 3842.0500186

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.4314519e+03   2.380082e+03   0.000000e+00      7s
     794    5.0566703e+03   0.000000e+00   0.000000e+00      7s

Root relaxation: objective 5.056670e+03, 794 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                    5056.6702574 10385.7410   105%     -    6s
     0     0         -    0     5056.67026 5056.67026  0.00%     -    6s

Explored 1 nodes (1210 simplex iterations) in 7.06 seconds (7.16 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 5056.67 3842.05 3593.05

Optimal solution found (tolerance 1.00e-08)
Best objective 5.056670257367e+03, best bound 5.056670257367e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5056

  Itr = 0
Collect_LB =   [712.0]
Collect_UB =   [10825.340514734511]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [5056.6702573672555]
Collect_MPObjValNHua =   [712.0]


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 552258 rows, 283978 columns and 1530712 nonzeros
```

```
Model fingerprint: 0xcbac55c2
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 305128 rows and 255611 columns (presolve time = 5s) ...
Presolve removed 305128 rows and 255611 columns (presolve time = 10s) ...
Presolve removed 305128 rows and 255611 columns (presolve time = 15s) ...
Presolve removed 498317 rows and 271277 columns
Presolve time: 17.15s
Presolved: 53941 rows, 12701 columns, 182064 nonzeros
Variable types: 0 continuous, 12701 integer (12674 binary)

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

Root relaxation presolved: 53921 rows, 12721 columns, 182004 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    5.7686703e+03   3.265000e+02   4.047642e+08     18s
Concurrent spin time: 0.14s

Solved with dual simplex (primal model)

Root relaxation: objective 5.768670e+03, 6266 iterations, 0.92 seconds (1.44 work units)

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

     0     0 5768.67026    0   29          - 5768.67026      -     -   19s
     0     0 5768.67026    0   72          - 5768.67026      -     -   21s
H    0     0                    7608.6702574 5768.67026  24.2%     -   21s
H    0     0                    7568.6702574 5768.67026  23.8%     -   21s
     0     0 5768.67026    0  188 7568.67026 5768.67026  23.8%     -   22s
     0     0 5768.67026    0  179 7568.67026 5768.67026  23.8%     -   22s
     0     0 5768.67026    0   83 7568.67026 5768.67026  23.8%     -   29s
     0     0 5768.67026    0  318 7568.67026 5768.67026  23.8%     -   31s
     0     0 5768.67026    0   81 7568.67026 5768.67026  23.8%     -   34s
H    0     0                    7388.6702574 5768.67026  21.9%     -   34s
     0     0 5768.67026    0  242 7388.67026 5768.67026  21.9%     -   35s
     0     0 5768.67026    0  162 7388.67026 5768.67026  21.9%     -   36s
H    0     0                    6808.6702574 5768.67026  15.3%     -   39s
     0     0 5768.67026    0   96 6808.67026 5768.67026  15.3%     -   40s
     0     0 5768.67026    0   93 6808.67026 5768.67026  15.3%     -   40s
     0     0 5768.67026    0  232 6808.67026 5768.67026  15.3%     -   41s
     0     0 5768.67026    0  226 6808.67026 5768.67026  15.3%     -   41s
     0     0 5768.67026    0  386 6808.67026 5768.67026  15.3%     -   43s
     0     0 5768.67026    0  364 6808.67026 5768.67026  15.3%     -   43s
     0     0 5768.67026    0  185 6808.67026 5768.67026  15.3%     -   46s
     0     0 5768.67026    0  151 6808.67026 5768.67026  15.3%     -   47s
H    0     0                    5768.6702574 5768.67026  0.00%     -   50s
     0     0 5768.67026    0  151 5768.67026 5768.67026  0.00%     -   50s

Cutting planes:
  Learned: 1
  Gomory: 2
  Cover: 62
  Implied bound: 37
  Clique: 735
  MIR: 46
  StrongCG: 34
  GUB cover: 15
  Zero half: 3
  RLT: 7
  Relax-and-lift: 28
  BQP: 24

Explored 1 nodes (125472 simplex iterations) in 50.96 seconds (71.19 work units)
Thread count was 8 (of 8 available processors)

Solution count 5: 5768.67 6808.67 7388.67 ... 7608.67

Optimal solution found (tolerance 5.00e-04)
Best objective 5.768670257367e+03, best bound 5.768670257367e+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 2481762 rows, 1955335 columns and 17236452 nonzeros
Model fingerprint: 0x73e2def3
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 2477083 rows and 1953782 columns (presolve time = 5s) ...
Presolve removed 2477083 rows and 1953782 columns
Presolve time: 5.21s
Presolved: 4679 rows, 1553 columns, 12419 nonzeros
Variable types: 8 continuous, 1545 integer (897 binary)
Found heuristic solution: objective 3675.0646186

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    8.9524519e+03   3.695526e+03   0.000000e+00      7s
    1583    5.3206703e+03   0.000000e+00   0.000000e+00      7s

Root relaxation: objective 5.320670e+03, 1583 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

H    0     0                    5320.6702574 13891.7410   161%     -    6s
     0     0        -    0      5320.67026 5320.67026  0.00%     -    6s

Explored 1 nodes (2262 simplex iterations) in 6.87 seconds (7.06 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 5320.67 3675.06

Optimal solution found (tolerance 1.00e-08)
Best objective 5.320670257367e+03, best bound 5.320670257367e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5320

 Itr = 1
Collect_LB =   [712.0, 5768.6702573672555]
Collect_UB =   [10825.340514734511, 6032.6702573672555]
Collect_Hua =   [0.0, 5056.6702573672555]
Collect_SPObjVal =   [5056.6702573672555, 5320.6702573672555]
Collect_MPObjValNHua =   [712.0, 712.0]


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 552259 rows, 283978 columns and 1530731 nonzeros
Model fingerprint: 0x2d4ad06b
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 305578 rows and 255677 columns (presolve time = 5s) ...
Presolve removed 305578 rows and 255677 columns (presolve time = 10s) ...
Presolve removed 305578 rows and 255677 columns (presolve time = 15s) ...
Presolve removed 447505 rows and 271325 columns (presolve time = 20s) ...
Presolve removed 498941 rows and 271325 columns
Presolve time: 20.69s
Presolved: 53318 rows, 12653 columns, 181007 nonzeros
Variable types: 0 continuous, 12653 integer (12626 binary)

```

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

Root relaxation presolved: 53299 rows, 12672 columns, 180950 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    6.0326703e+03   3.243750e+02   4.038423e+08     22s
Concurrent spin time: 0.16s

Solved with dual simplex (primal model)

Root relaxation: objective 6.032670e+03, 5942 iterations, 1.32 seconds (1.48 work units)

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

     0     0 6032.67026    0   39          - 6032.67026      -     -   23s
     0     0 6032.67026    0   71          - 6032.67026      -     -   27s
     0     0 6032.67026    0   64          - 6032.67026      -     -   27s
     0     0 6032.67026    0  273          - 6032.67026      -     -   29s
     0     0 6032.67026    0  262          - 6032.67026      -     -   29s
     0     0 6032.67026    0  119          - 6032.67026      -     -   37s
     0     0 6032.67026    0  210          - 6032.67026      -     -   37s
     0     0 6032.67026    0  224          - 6032.67026      -     -   52s
     0     0 6032.67026    0  213          - 6032.67026      -     -   53s
     0     0 6032.67026    0   77          - 6032.67026      -     -   61s
H    0     0                 9972.6702574 6032.67026  39.5%     -   61s
     0     0 6032.67026    0   77 9972.67026 6032.67026  39.5%     -   62s
H    0     0                 7752.6702574 6032.67026  22.2%     -   64s
H    0     0                 6032.6702574 6032.67026  0.00%     -   67s
     0     0 6032.67026    0   77 6032.67026 6032.67026  0.00%     -   68s

Cutting planes:
  Learned: 4
  Cover: 15
  Implied bound: 406
  Clique: 275
  MIR: 91
  StrongCG: 40
  GUB cover: 4
  RLT: 14
  Relax-and-lift: 58
  BQP: 38

Explored 1 nodes (98657 simplex iterations) in 68.04 seconds (71.47 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 6032.67 7752.67 9972.67

Optimal solution found (tolerance 5.00e-04)
Best objective 6.032670257367e+03, best bound 6.032670257367e+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 2481762 rows, 1955335 columns and 17236452 nonzeros
Model fingerprint: 0xc551aa33
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 2477053 rows and 1953772 columns (presolve time = 5s) ...
Presolve removed 2477059 rows and 1953772 columns
Presolve time: 5.47s
Presolved: 4703 rows, 1563 columns, 12438 nonzeros
Variable types: 8 continuous, 1555 integer (901 binary)
Found heuristic solution: objective 3687.8601380

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    8.9924519e+03   3.690101e+03   0.000000e+00      7s
    1269    5.3328601e+03   0.000000e+00   0.000000e+00      7s
```

```
Root relaxation: objective 5.332860e+03, 1269 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

     0     0 5332.86014    0    5 3687.86014 5332.86014  44.6%     -    6s
H    0     0                    5312.8601380 5332.86014  0.38%     -    6s
H    0     0                    5332.8601380 5332.86014  0.00%     -    7s
     0     0 5332.86014    0    5 5332.86014 5332.86014  0.00%     -    7s

Explored 1 nodes (1866 simplex iterations) in 7.28 seconds (7.07 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 5332.86 5312.86 3687.86

Optimal solution found (tolerance 1.00e-08)
Best objective 5.332860137998e+03, best bound 5.332860137998e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5332

 Itr = 2
Collect_LB =   [712.0, 5768.6702573672555, 6032.6702573672555]
Collect_UB =   [10825.340514734511, 6032.6702573672555, 6032.6702573672555]
Collect_Hua =   [0.0, 5056.6702573672555, 5320.6702573672555]
Collect_SPObjVal =   [5056.6702573672555, 5320.6702573672555, 5332.8601379975335]
Collect_MPObjValNHua =   [712.0, 712.0, 712.0]


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

~~~~~~~~~~judge = 2, SPObj_SPF = 5332.8601379975335
Vessel i: 0:     pi: 0-5,     ai-di: 38-81,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 38-81,     taoi-deltai: 38-50,     taoPi_SP-deltaPi_SP: 38-50,     betaNi:
    12,     bi: 12
Vessel i: 1:     pi: 0-5,     ai-di: 8-18,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 8-18,     taoi-deltai: 8-13,     taoPi_SP-deltaPi_SP: 11-13,     betaNi: 5
    ,     bi: 5
Vessel i: 2:     pi: 5-11,     ai-di: 32-67,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 32-67,     taoi-deltai: 32-53,     taoPi_SP-deltaPi_SP: 32-53,     betaNi
    : 21,     bi: 21
Vessel i: 3:     pi: 5-10,     ai-di: 12-38,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 12-38,     taoi-deltai: 12-25,     taoPi_SP-deltaPi_SP: 12-25,     betaNi
    : 13,     bi: 13
Vessel i: 4:     pi: 13-18,     ai-di: 43-81,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 43-81,     taoi-deltai: 43-54,     taoPi_SP-deltaPi_SP: 43-54,
    betaNi: 11,     bi: 11
Vessel i: 5:     pi: 20-25,     ai-di: 11-45,     gi_SP-gpi_SP: 0.000000-0.600000,     ai_SP-di: 11-45,     taoi-deltai: 11-26,     taoPi_SP-deltaPi_SP: 11-26,
    betaNi: 15,     bi: 15
Vessel i: 6:     pi: 11-18,     ai-di: 3-60,     gi_SP-gpi_SP: 1.000000-0.000000,     ai_SP-di: 11-60,     taoi-deltai: 11-39,     taoPi_SP-deltaPi_SP: 11-39,     betaNi
    : 28,     bi: 28
Vessel i: 7:     pi: 18-23,     ai-di: 31-79,     gi_SP-gpi_SP: 0.600000-1.000000,     ai_SP-di: 37-79,     taoi-deltai: 35-39,     taoPi_SP-deltaPi_SP: 37-39,
    betaNi: 4,     bi: 4
Vessel i: 8:     pi: 28-34,     ai-di: 19-68,     gi_SP-gpi_SP: 0.800000-0.800000,     ai_SP-di: 24-68,     taoi-deltai: 26-41,     taoPi_SP-deltaPi_SP: 26-41,
    betaNi: 15,     bi: 15

round LB =   [712, 5769, 6033]
round UB =   [10825, 6033, 6033]
round Hua =   [0, 5057, 5321]
round SPObjVal =   [5057, 5321, 5333]
round MPObjValNHua =   [712, 712, 712]

OptimalObj = 6032.6702573672555
Time: 635.000000
```