```
"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=16423

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 583306 rows, 52642 columns and 1624240 nonzeros
Model fingerprint: 0x09edb1e3
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 399361 rows and 28618 columns (presolve time = 5s) ...
Presolve removed 519996 rows and 37419 columns
Presolve time: 7.12s
Presolved: 63310 rows, 15223 columns, 224391 nonzeros
Variable types: 0 continuous, 15223 integer (15203 binary)

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

Root relaxation presolved: 15223 rows, 78533 columns, 239614 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    1.0170000e+03   0.000000e+00   1.056750e+03      8s
Concurrent spin time: 0.00s

Solved with dual simplex (primal model)

Root relaxation: objective 1.017000e+03, 2112 iterations, 0.30 seconds (0.28 work units)

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

     0     0 1017.00000    0   18          - 1017.00000      -     -    8s
     0     0 1017.00000    0  218          - 1017.00000      -     -    8s
     0     0 1017.00000    0  212          - 1017.00000      -     -    8s
     0     0 1017.00000    0  257          - 1017.00000      -     -    9s
     0     0 1017.00000    0  254          - 1017.00000      -     -    9s
     0     0 1017.00000    0   18          - 1017.00000      -     -   11s
     0     0 1017.00000    0  403          - 1017.00000      -     -   12s
     0     0 1017.00000    0  366          - 1017.00000      -     -   12s
H    0     0                3217.0000000 1017.00000  68.4%     -   12s
     0     0 1017.00000    0  400 3217.00000 1017.00000  68.4%     -   12s
     0     0 1017.00000    0  134 3217.00000 1017.00000  68.4%     -   21s
H    0     0                2637.0000000 1017.00000  61.4%     -   21s
H    0     0                2257.0000000 1017.00000  54.9%     -   23s
H    0     0                1017.0000000 1017.00000  0.00%     -   23s

Cutting planes:
  Gomory: 14
  Cover: 242
  Implied bound: 583
  Clique: 292
  MIR: 25
  StrongCG: 8
  GUB cover: 13
  Zero half: 6
  RLT: 8
```

```
  Relax-and-lift: 4
  BQP: 4

Explored 1 nodes (19221 simplex iterations) in 23.65 seconds (45.71 work units)
Thread count was 8 (of 8 available processors)

Solution count 4: 1017 2257 2637 3217

Optimal solution found (tolerance 1.00e-10)
Best objective 1.017000000000e+03, best bound 1.017000000000e+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 2481560 rows, 1955335 columns and 17235839 nonzeros
Model fingerprint: 0x8f6094e5
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 2478308 rows and 1954170 columns
Presolve time: 4.82s
Presolved: 3252 rows, 1165 columns, 8595 nonzeros
Variable types: 8 continuous, 1157 integer (659 binary)
Found heuristic solution: objective 4309.8302838

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    8.9802796e+03   8.166827e+03   0.000000e+00      6s
     925    5.5971303e+03   0.000000e+00   0.000000e+00      6s

Root relaxation: objective 5.597130e+03, 925 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

     0     0 5597.13028    0   18 4309.83028 5597.13028  29.9%     -    6s
H    0     0                    5595.3302838 5597.13028  0.03%     -    6s
*    0     0               0    5596.8302838 5596.83028  0.00%     -    6s

Cutting planes:
  Learned: 1
  MIR: 1
  RLT: 1

Explored 1 nodes (1299 simplex iterations) in 6.35 seconds (7.56 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 5596.83 5595.33 4309.83

Optimal solution found (tolerance 1.00e-08)
Best objective 5.596830283766e+03, best bound 5.596830283766e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5596

  Itr = 0
Collect_LB =   [1017.0]
Collect_UB =   [12210.660567532992]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [5596.830283766496]
Collect_MPObjValNHua =   [1017.0]


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 1126481 rows, 303661 columns and 3329693 nonzeros
Model fingerprint: 0xc2a3ddbf
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 977131 rows and 283914 columns (presolve time = 5s) ...
Presolve removed 991673 rows and 285175 columns (presolve time = 10s) ...
Presolve removed 1059124 rows and 292247 columns
Presolve time: 10.90s
Presolved: 67357 rows, 11414 columns, 216560 nonzeros
Variable types: 1 continuous, 11413 integer (9486 binary)

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

Root relaxation presolved: 11414 rows, 78771 columns, 227974 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.0313303e+03   0.000000e+00   3.090231e+04     12s
Concurrent spin time: 0.32s

Solved with dual simplex (primal model)

Root relaxation: objective 7.031330e+03, 7092 iterations, 1.23 seconds (1.43 work units)

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

     0     0 7031.33028    0  387          - 7031.33028      -     -   15s
     0     0 7031.33028    0  387          - 7031.33028      -     -   15s
     0     0 7031.33028    0  540          - 7031.33028      -     -   17s
     0     0 7031.33028    0  540          - 7031.33028      -     -   17s
     0     0 7031.33028    0  540          - 7031.33028      -     -   17s
     0     0 7031.33028    0  555          - 7031.33028      -     -   18s
     0     0 7031.33028    0  496          - 7031.33028      -     -   18s
     0     0 7031.33028    0  347          - 7031.33028      -     -   27s
     0     0 7031.33028    0  420          - 7031.33028      -     -   29s
     0     0 7031.33028    0  424          - 7031.33028      -     -   29s
     0     0 7031.33028    0  268          - 7031.33028      -     -   37s
     0     0 7031.33028    0  352          - 7031.33028      -     -   38s
     0     0 7031.33028    0  219          - 7031.33028      -     -   45s
     0     0 7031.33028    0  216          - 7031.33028      -     -   45s
     0     0 7031.33028    0  222          - 7031.33028      -     -   46s
     0     0 7031.33028    0  192          - 7031.33028      -     -   52s
     0     0 7031.33028    0  231          - 7031.33028      -     -   52s
     0     0 7031.33028    0  342          - 7031.33028      -     -   53s
     0     0 7031.33028    0  320          - 7031.33028      -     -   53s
H    0     0                 7071.3302838 7031.33028  0.57%    -   57s
     0     0 7031.33028    0  329 7071.33028 7031.33028  0.57%    -   57s

Cutting planes:
  Learned: 15
  Gomory: 4
  Cover: 440
  Implied bound: 219
  Clique: 1654
  MIR: 163
  StrongCG: 48
  Flow cover: 17
  GUB cover: 311
  Zero half: 63
  Network: 1
  RLT: 88
  Relax-and-lift: 320
  BQP: 63

Explored 1 nodes (117042 simplex iterations) in 57.15 seconds (100.30 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 7071.33

Optimal solution found (tolerance 5.00e-02)
Best objective 7.071330283766e+03, best bound 7.031330283766e+03, gap 0.5657%
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 2481560 rows, 1955335 columns and 17235839 nonzeros
```

```
Model fingerprint: 0xa71d478b
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 2475686 rows and 1953401 columns
Presolve time: 4.84s
Presolved: 5874 rows, 1934 columns, 15651 nonzeros
Variable types: 8 continuous, 1926 integer (1111 binary)
Found heuristic solution: objective 4273.8302838

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    1.1567280e+04   6.736059e+03   0.000000e+00      6s
    1911    6.0871303e+03   0.000000e+00   0.000000e+00      6s

Root relaxation: objective 6.087130e+03, 1911 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 6087.13028    0   17 4273.83028 6087.13028  42.4%     -    6s
H    0     0                    6086.8302838 6087.13028  0.00%     -    6s

Cutting planes:
  Learned: 2
  Cover: 10
  Implied bound: 10
  MIR: 2

Explored 1 nodes (2436 simplex iterations) in 6.37 seconds (7.52 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 6086.83 4273.83

Optimal solution found (tolerance 1.00e-08)
Best objective 6.086830283766e+03, best bound 6.086830283766e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□6086

  Itr = 1
Collect_LB =   [1017.0, 7071.330283766496]
Collect_UB =   [12210.660567532992, 7561.330283766496]
Collect_Hua =   [0.0, 5596.830283766496]
Collect_SPObjVal =   [5596.830283766496, 6086.830283766496]
Collect_MPObjValNHua =   [1017.0, 1474.5]


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 1662675 rows, 323344 columns and 5028129 nonzeros
Model fingerprint: 0xddc6c696
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 1469762 rows and 298513 columns (presolve time = 5s) ...
Presolve removed 1501741 rows and 300551 columns (presolve time = 10s) ...
Presolve removed 1564235 rows and 307490 columns
Presolve time: 14.40s
Presolved: 98440 rows, 15854 columns, 334414 nonzeros
Variable types: 1 continuous, 15853 integer (12018 binary)

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

Root relaxation presolved: 15854 rows, 114276 columns, 350152 nonzeros
```

```
Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.5213303e+03   0.000000e+00   1.605501e+05     15s
   23521    7.5213303e+03   0.000000e+00   0.000000e+00     17s
   23521    7.5213303e+03   0.000000e+00   0.000000e+00     17s
   23521    7.5213303e+03   0.000000e+00   0.000000e+00     17s
Concurrent spin time: 1.09s

Solved with primal simplex

Root relaxation: objective 7.521330e+03, 23521 iterations, 2.97 seconds (4.07 work units)
Total elapsed time = 20.81s

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

     0     0 7521.33028    0  630          - 7521.33028      -     -   23s
     0     0 7521.33028    0  641          - 7521.33028      -     -   23s
     0     0 7521.33028    0 1301          - 7521.33028      -     -   29s
     0     0 7521.33028    0 1159          - 7521.33028      -     -   29s
     0     0 7521.33028    0 1030          - 7521.33028      -     -   33s
     0     0 7521.33028    0 1023          - 7521.33028      -     -   33s
     0     0 7521.33028    0  574          - 7521.33028      -     -   46s
     0     0 7521.33028    0  914          - 7521.33028      -     -   50s
     0     0 7521.33028    0  338          - 7521.33028      -     -   59s
     0     0 7521.33028    0  640          - 7521.33028      -     -   60s
     0     0 7521.33028    0  630          - 7521.33028      -     -   60s
     0     0 7521.33028    0  465          - 7521.33028      -     -   68s
     0     0 7521.33028    0  420          - 7521.33028      -     -   68s
     0     0 7521.33028    0  440          - 7521.33028      -     -   69s
     0     0 7521.33028    0  599          - 7521.33028      -     -   75s
     0     0 7521.33028    0  648          - 7521.33028      -     -   75s
     0     0 7521.33028    0  810          - 7521.33028      -     -   79s
     0     0 7521.33028    0  567          - 7521.33028      -     -   85s
     0     0 7521.33028    0  454          - 7521.33028      -     -   87s
     0     2 7521.33028    0  454          - 7521.33028      -     -   95s
     3     8 7521.33028    2  572          - 7521.33028      -  6444  101s
    11    16 7521.33028    3 1114          - 7521.33028      -  6404  108s
    19    24 7521.33028    5  707          - 7521.33028      -  4880  119s
    23    29 7521.33028    6  605          - 7521.33028      -  5922  122s
    28    40 7521.33028    8  600          - 7521.33028      -  5882  127s
    39    59 7521.33028   10  798          - 7521.33028      -  5261  136s
    64    97 7521.33028   17  997          - 7521.33028      -  4469  155s
   111   180 7521.33028   23  718          - 7521.33028      -  4451  178s
   257   253 7561.33028   53  769          - 7521.33028      -  2820  194s
   413   369 7561.33028  121  676          - 7521.33028      -  2018  210s
   613   491 7561.33028  205  356          - 7521.33028      -  1522  222s
H  774   295                    7561.3302838 7521.33028  0.53%  1305  234s

Cutting planes:
  Learned: 26
  Gomory: 5
  Cover: 768
  Implied bound: 725
  Clique: 3771
  MIR: 324
  StrongCG: 70
  Flow cover: 34
  GUB cover: 471
  Zero half: 53
  RLT: 177
  Relax-and-lift: 316
  BQP: 159
  PSD: 3

Explored 928 nodes (1350217 simplex iterations) in 234.86 seconds (775.17 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 7561.33

Optimal solution found (tolerance 5.00e-02)
Best objective 7.561330283766e+03, best bound 7.521330283766e+03, gap 0.5290%
Warning: linear constraint 590288 and linear constraint 1126482 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 2481560 rows, 1955335 columns and 17235839 nonzeros
Model fingerprint: 0x5fae8a5d
```

```
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 2475620 rows and 1953381 columns
Presolve time: 4.80s
Presolved: 5940 rows, 1954 columns, 15773 nonzeros
Variable types: 8 continuous, 1946 integer (1121 binary)
Found heuristic solution: objective 4320.8302838
Found heuristic solution: objective 4340.8302838

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    1.2007280e+04   8.760652e+03   0.000000e+00      6s
    2042    6.0871303e+03   0.000000e+00   0.000000e+00      6s

Root relaxation: objective 6.087130e+03, 2042 iterations, 0.03 seconds (0.03 work units)

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

     0     0 6087.13028    0   17 4340.83028 6087.13028  40.2%     -    6s
H    0     0                    6086.8302838 6087.13028  0.00%     -    6s

Cutting planes:
  Learned: 2
  Cover: 10
  Implied bound: 10
  MIR: 2

Explored 1 nodes (2811 simplex iterations) in 6.38 seconds (7.54 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 6086.83 4340.83 4320.83

Optimal solution found (tolerance 1.00e-08)
Best objective 6.086830283766e+03, best bound 6.086830283766e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□6086

 Itr = 2
Collect_LB =  [1017.0, 7071.330283766496, 7561.330283766496]
Collect_UB =  [12210.660567532992, 7561.330283766496, 7561.330283766496]
Collect_Hua =  [0.0, 5596.830283766496, 6086.830283766496]
Collect_SPObjVal =  [5596.830283766496, 6086.830283766496, 6086.830283766496]
Collect_MPObjValNHua =  [1017.0, 1474.5, 1474.5]


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

~~~~~~~~~~judge = 2, SPObj_SPF = 6086.830283766496
Vessel i: 0:    pi: 0-6,    ai-di: 7-27,    gi_SP-gpi_SP: 0.000000-0.000000,    ai_SP-di: 7-27,    taoi-deltai: 7-29,    taoPi_SP-deltaPi_SP: 7-29,    betaNi: 22
,    bi: 22
Vessel i: 1:    pi: 14-20,    ai-di: 9-18,    gi_SP-gpi_SP: 0.000000-0.000000,    ai_SP-di: 9-18,    taoi-deltai: 9-18,    taoPi_SP-deltaPi_SP: 9-18,    betaNi: 9
,    bi: 9
Vessel i: 2:    pi: 8-14,    ai-di: 11-40,    gi_SP-gpi_SP: 0.000000-0.000000,    ai_SP-di: 11-40,    taoi-deltai: 11-42,    taoPi_SP-deltaPi_SP: 11-42,    betaNi
: 31,    bi: 31
Vessel i: 3:    pi: 21-27,    ai-di: 17-31,    gi_SP-gpi_SP: 0.000000-0.000000,    ai_SP-di: 17-31,    taoi-deltai: 17-27,    taoPi_SP-deltaPi_SP: 17-27,
betaNi: 10,    bi: 10
Vessel i: 4:    pi: 14-20,    ai-di: 18-23,    gi_SP-gpi_SP: 0.000000-0.000000,    ai_SP-di: 18-23,    taoi-deltai: 19-24,    taoPi_SP-deltaPi_SP: 19-24,
betaNi: 5,    bi: 5
Vessel i: 5:    pi: 27-34,    ai-di: 26-30,    gi_SP-gpi_SP: 0.025000-1.000000,    ai_SP-di: 26-30,    taoi-deltai: 27-32,    taoPi_SP-deltaPi_SP: 27-32,
betaNi: 5,    bi: 5
Vessel i: 6:    pi: 18-24,    ai-di: 33-42,    gi_SP-gpi_SP: 0.375000-0.200000,    ai_SP-di: 36-42,    taoi-deltai: 36-45,    taoPi_SP-deltaPi_SP: 36-45,
betaNi: 9,    bi: 9
Vessel i: 7:    pi: 14-20,    ai-di: 37-68,    gi_SP-gpi_SP: 1.000000-0.600000,    ai_SP-di: 47-68,    taoi-deltai: 47-77,    taoPi_SP-deltaPi_SP: 47-77,
betaNi: 30,    bi: 30
Vessel i: 8:    pi: 28-34,    ai-di: 46-64,    gi_SP-gpi_SP: 1.000000-0.600000,    ai_SP-di: 53-64,    taoi-deltai: 53-74,    taoPi_SP-deltaPi_SP: 53-74,
betaNi: 21,    bi: 21

round LB =  [1017, 7071, 7561]
round UB =  [12211, 7561, 7561]
round Hua =  [0, 5597, 6087]
round SPObjVal =  [5597, 6087, 6087]
round MPObjValNHua =  [1017, 1474, 1474]

```

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491   Time: 779.000000
492
493
494
495
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