```
"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=10681

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 619028 rows, 58701 columns and 1738778 nonzeros
Model fingerprint: 0x6d0d7cf6
Variable types: 1 continuous, 58700 integer (58660 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 387375 rows and 28383 columns (presolve time = 5s) ...
Presolve removed 536416 rows and 39539 columns
Presolve time: 8.99s
Presolved: 82612 rows, 19162 columns, 288490 nonzeros
Variable types: 0 continuous, 19162 integer (19136 binary)

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

Root relaxation presolved: 19162 rows, 101774 columns, 307652 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    9.9100000e+02   0.000000e+00   1.206000e+03     10s
Concurrent spin time: 0.00s

Solved with dual simplex (primal model)

Root relaxation: objective 9.910000e+02, 2421 iterations, 0.47 seconds (0.39 work units)
Total elapsed time = 10.80s

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

     0     0  991.00000    0   20          -  991.00000      -     -   11s
     0     0  991.00000    0   93          -  991.00000      -     -   12s
     0     0  991.00000    0  104          -  991.00000      -     -   12s
H    0     0                6691.0000000  991.00000  85.2%     -   13s
H    0     0                4611.0000000  991.00000  78.5%     -   13s
     0     0  991.00000    0  104 4611.00000  991.00000  78.5%     -   13s
     0     0  991.00000    0   19 4611.00000  991.00000  78.5%     -   14s
     0     0  991.00000    0   27 4611.00000  991.00000  78.5%     -   15s
     0     0  991.00000    0   92 4611.00000  991.00000  78.5%     -   17s
     0     0  991.00000    0   88 4611.00000  991.00000  78.5%     -   18s
H    0     0                2611.0000000  991.00000  62.0%     -   18s
     0     0  991.00000    0   85 2611.00000  991.00000  62.0%     -   19s
     0     0  991.00000    0   68 2611.00000  991.00000  62.0%     -   20s
     0     0  991.00000    0   68 2611.00000  991.00000  62.0%     -   20s
H    0     0                1311.0000000  991.00000  24.4%     -   20s
     0     2  991.00000    0   29 1311.00000  991.00000  24.4%     -   23s
     3     8  991.00000    2   48 1311.00000  991.00000  24.4% 3389   25s
    42    46  991.00000    6  146 1311.00000  991.00000  24.4%  848   30s
H   66    79                 991.0000000  991.00000  0.00% 1075   33s

Cutting planes:
  Gomory: 1
  Cover: 117
  Implied bound: 649
```

```
  Clique: 4
  MIR: 102
  StrongCG: 56
  GUB cover: 11
  Zero half: 5
  RLT: 10
  Relax-and-lift: 612
  BQP: 8

Explored 117 nodes (126391 simplex iterations) in 33.90 seconds (65.83 work units)
Thread count was 8 (of 8 available processors)

Solution count 5: 991 1311 2611 ... 6691

Optimal solution found (tolerance 1.00e-10)
Best objective 9.910000000000e+02, best bound 9.910000000000e+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 654086 rows, 16030 columns and 1337366 nonzeros
Model fingerprint: 0x45aafa6f
Variable types: 40 continuous, 15990 integer (9240 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 650289 rows and 14621 columns
Presolve time: 0.56s
Presolved: 3797 rows, 1409 columns, 10130 nonzeros
Variable types: 10 continuous, 1399 integer (819 binary)
Found heuristic solution: objective 4594.6120144
Found heuristic solution: objective 4599.2524802

Root relaxation: objective 6.569244e+03, 1373 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 6569.24444    0   33 4599.25248 6569.24444  42.8%     -    0s
H    0     0                6539.4691941 6569.24444  0.46%     -    0s
H    0     0                6546.4552604 6569.24444  0.35%     -    0s
*    0     0               0    6566.4444444 6566.44444  0.00%     -    0s

Cutting planes:
  Learned: 1
  Gomory: 5
  Cover: 2
  Implied bound: 3
  MIR: 2
  Flow cover: 4
  RLT: 2
  Relax-and-lift: 1
  PSD: 1

Explored 1 nodes (1867 simplex iterations) in 0.78 seconds (1.03 work units)
Thread count was 8 (of 8 available processors)

Solution count 5: 6566.44 6546.46 6539.47 ... 4594.61

Optimal solution found (tolerance 1.00e-08)
Best objective 6.566444444444e+03, best bound 6.566444444444e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□6566

 Itr = 0
Collect_LB =   [991.0]
Collect_UB =   [14123.888888888883]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [6566.444444444442]
Collect_MPObjValNHua =   [991.0]


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 628195 rows, 344301 columns and 1747990 nonzeros
Model fingerprint: 0x0c2c46f6
Variable types: 1 continuous, 344300 integer (344260 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 471430 rows and 325200 columns (presolve time = 5s) ...
Presolve removed 578969 rows and 335642 columns
Presolve time: 9.16s
Presolved: 49226 rows, 8659 columns, 127720 nonzeros
Variable types: 0 continuous, 8659 integer (8636 binary)
Root relaxation presolved: 8659 rows, 57885 columns, 136379 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0     handle free variables                         10s
    4785    8.7463773e+03   3.681598e+03   0.000000e+00     10s
    7610    7.9174444e+03   0.000000e+00   0.000000e+00     11s
    7610    7.9174444e+03   0.000000e+00   0.000000e+00     11s

Root relaxation: objective 7.917444e+03, 7610 iterations, 1.03 seconds (1.55 work units)

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

     0     0 7917.44444    0   45          - 7917.44444      -     -   11s
     0     0 7917.44444    0  198          - 7917.44444      -     -   12s
     0     0 7917.44444    0  162          - 7917.44444      -     -   12s
     0     0 7917.44444    0  377          - 7917.44444      -     -   13s
     0     0 7917.44444    0   27          - 7917.44444      -     -   15s
     0     0 7917.44444    0  238          - 7917.44444      -     -   16s
     0     0 7917.44444    0  131          - 7917.44444      -     -   17s
     0     0 7917.44444    0  130          - 7917.44444      -     -   17s
     0     0 7917.44444    0  250          - 7917.44444      -     -   17s
     0     0 7917.44444    0  154          - 7917.44444      -     -   19s
     0     0 7917.44444    0  248          - 7917.44444      -     -   19s
     0     0 7917.44444    0  245          - 7917.44444      -     -   19s
H    0     0                    7917.4444444 7917.44444  0.00%     -   21s
     0     0 7917.44444    0  211 7917.44444 7917.44444  0.00%     -   21s

Cutting planes:
  Learned: 4
  Gomory: 3
  Cover: 186
  Implied bound: 1306
  Clique: 443
  MIR: 193
  StrongCG: 125
  GUB cover: 43
  Zero half: 13
  RLT: 35
  Relax-and-lift: 104
  BQP: 25

Explored 1 nodes (40537 simplex iterations) in 21.90 seconds (27.92 work units)
Thread count was 8 (of 8 available processors)

Solution count 1: 7917.44

Optimal solution found (tolerance 1.00e-10)
Best objective 7.917444444444e+03, best bound 7.917444444444e+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 654086 rows, 16030 columns and 1337366 nonzeros
Model fingerprint: 0x81e05b7d
Variable types: 40 continuous, 15990 integer (9240 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 647393 rows and 13825 columns
Presolve time: 0.50s
Presolved: 6693 rows, 2205 columns, 17882 nonzeros
Variable types: 10 continuous, 2195 integer (1261 binary)
Found heuristic solution: objective 4878.5754258

Root relaxation: objective 7.123111e+03, 1790 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 7123.11111    0   17 4878.57543 7123.11111  46.0%     -    0s
H    0     0                    7104.4444444 7123.11111  0.26%     -    0s
*    0     0               0    7120.4444444 7120.44444  0.00%     -    0s

Cutting planes:
  Learned: 2
  Gomory: 5
  Cover: 1
  Implied bound: 2
  Flow cover: 3
  Zero half: 1
  RLT: 4
  Relax-and-lift: 5
  PSD: 1

Explored 1 nodes (2545 simplex iterations) in 0.77 seconds (1.06 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 7120.44 7104.44 4878.58

Optimal solution found (tolerance 1.00e-08)
Best objective 7.120444444444e+03, best bound 7.120444444444e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□7120

 Itr = 1
Collect_LB =   [991.0, 7917.444444444442]
Collect_UB =   [14123.888888888883, 8471.444444444445]
Collect_Hua =   [0.0, 6566.444444444442]
Collect_SPObjVal =   [6566.444444444442, 7120.444444444445]
Collect_MPObjValNHua =   [991.0, 1351.0]


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 628195 rows, 344301 columns and 1747990 nonzeros
Model fingerprint: 0x59b64541
Variable types: 1 continuous, 344300 integer (344260 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 472886 rows and 325364 columns (presolve time = 5s) ...
Presolve removed 579366 rows and 335687 columns
Presolve time: 9.20s
Presolved: 48829 rows, 8614 columns, 126604 nonzeros
Variable types: 0 continuous, 8614 integer (8591 binary)
Root relaxation presolved: 8614 rows, 57443 columns, 135218 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0     handle free variables                         10s
    5415    8.8213760e+03   1.846503e+03   0.000000e+00     10s
    7450    8.5114444e+03   0.000000e+00   0.000000e+00     11s
    7450    8.5114444e+03   0.000000e+00   0.000000e+00     11s

Root relaxation: objective 8.511444e+03, 7450 iterations, 1.08 seconds (1.56 work units)
```

```
332
333     Nodes    |    Current Node    |    Objective Bounds     |     Work
334  Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
335
336     0     0 8511.44444    0   48         - 8511.44444      -     -    11s
337     0     0 8511.44444    0  359         - 8511.44444      -     -    12s
338     0     0 8511.44444    0  371         - 8511.44444      -     -    12s
339     0     0 8511.44444    0  168         - 8511.44444      -     -    13s
340     0     0 8511.44444    0  198         - 8511.44444      -     -    13s
341     0     0 8511.44444    0  170         - 8511.44444      -     -    15s
342     0     0 8511.44444    0  211         - 8511.44444      -     -    16s
343     0     0 8511.44444    0  221         - 8511.44444      -     -    16s
344     0     0 8511.44444    0  404         - 8511.44444      -     -    17s
345     0     0 8511.44444    0  379         - 8511.44444      -     -    17s
346     0     0 8511.44444    0  250         - 8511.44444      -     -    23s
347     0     0 8511.44444    0  248         - 8511.44444      -     -    23s
348     0     0 8511.44444    0  562         - 8511.44444      -     -    24s
349     0     0 8511.44444    0  424         - 8511.44444      -     -    24s
350     0     0 8511.44444    0  421         - 8511.44444      -     -    24s
351     0     0 8511.44444    0  279         - 8511.44444      -     -    27s
352     0     0 8511.44444    0  109         - 8511.44444      -     -    27s
353     0     2 8511.44444    0  109         - 8511.44444      -     -    30s
354    15    18 8511.44444    5  429         - 8511.44444      -  2420   35s
355    42    47 8518.40097   11  697         - 8511.44444      -  2133   41s
356    61    62 8551.44444   13  852         - 8511.44444      -  2035   45s
357    83    87 infeasible   21              - 8511.44444      -  1874   50s
358   217   241 8831.44444   77  190         - 8511.44444      -  1115   58s
359   320   352 8831.44444  128  192         - 8511.44444      -   836   62s
360   561   573 8871.44444  256  193         - 8511.44444      -   541   67s
361   723   611 8831.44444    4  438         - 8511.44444      -   473   70s
362   887   753 infeasible   24              - 8511.44444      -   430   76s
363  1077   952 8911.44444   20  399         - 8511.44444      -   396   81s
364  1373  1259 8911.44444  230  148         - 8511.44444      -   353   87s
365  1604  1415 8911.44444  252  260         - 8511.44444      -   325   90s
366  1786  1416 8547.50078   56  109         - 8511.44444      -   312  106s
367  1789  1418 8951.44444  257  223         - 8511.44444      -   311  112s
368  1790  1419 8511.44444    7  439         - 8511.44444      -   311  116s
369  1791  1419 9111.44444  480  375         - 8511.44444      -   311  121s
370  1793  1421 8751.44444  162  597         - 8511.44444      -   311  130s
371  1795  1422 9231.44444   42  317         - 8511.44444      -   310  139s
372  1796  1423 8951.44444  572  716         - 8511.44444      -   310  142s
373  1797  1423 8511.44444   22  507         - 8511.44444      -   310  148s
374  1798  1424 8871.44444  353  999         - 8511.44444      -   310  153s
375  1799  1425 9791.44444  181  665         - 8511.44444      -   310  158s
376  1800  1425 8911.44444  295  904         - 8511.44444      -   310  161s
377  H 1800  1353                    8631.4444444 8511.44444  1.39%   310  169s
378    1802  1355 8591.44444  211  645 8631.44444 8511.44444  1.39%   309  172s
379    1805  1358 8552.62092   38  109 8631.44444 8511.44444  1.39%   385  176s
380    1810  1363 8631.44444  231  109 8631.44444 8511.44444  1.39%   389  181s
381    1813  1365 8631.44444  511  427 8631.44444 8511.44444  1.39%   388  185s
382    1816  1367 8631.44444  170  497 8631.44444 8511.44444  1.39%   388  190s
383  H 1818  1299                    8591.4444444 8511.44444  0.93%   387  196s
384
385  Cutting planes:
386    Learned: 1
387    Gomory: 53
388    Cover: 175
389    Implied bound: 45
390    Projected implied bound: 9
391    Clique: 74
392    MIR: 54
393    StrongCG: 15
394    Flow cover: 117
395    GUB cover: 86
396    Zero half: 15
397    RLT: 60
398    Relax-and-lift: 98
399    BQP: 2
400
401  Explored 1818 nodes (810195 simplex iterations) in 196.21 seconds (299.91 work units)
402  Thread count was 8 (of 8 available processors)
403
404  Solution count 2: 8591.44 8631.44
405
406  Optimal solution found (tolerance 1.00e-10)
407  Best objective 8.591444444444e+03, best bound 8.591444444444e+03, gap 0.0000%
408  Set parameter MIPGap to value 1e-08
409  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
410
411  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
412  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
413
414  Optimize a model with 654086 rows, 16030 columns and 1337366 nonzeros
415  Model fingerprint: 0xba419400
```

```
Variable types: 40 continuous, 15990 integer (9240 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 647707 rows and 13921 columns
Presolve time: 0.50s
Presolved: 6379 rows, 2109 columns, 17146 nonzeros
Variable types: 10 continuous, 2099 integer (1212 binary)
Found heuristic solution: objective 4929.7421607
Found heuristic solution: objective 4933.6310496

Root relaxation: objective 7.128444e+03, 1822 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

H    0     0                    7128.4444444 19593.7778   175%     -    0s
     0     0         -    0     7128.44444 7128.44444  0.00%     -    0s

Explored 1 nodes (2536 simplex iterations) in 0.74 seconds (1.00 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 7128.44 4933.63 4929.74

Optimal solution found (tolerance 1.00e-08)
Best objective 7.128444444444e+03, best bound 7.128444444444e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□7128

 Itr = 2
Collect_LB =   [991.0, 7917.444444444442, 8591.444444444445]
Collect_UB =   [14123.888888888883, 8471.444444444445, 8471.444444444445]
Collect_Hua =   [0.0, 6566.444444444442, 7120.444444444445]
Collect_SPObjVal =   [6566.444444444442, 7120.444444444445, 7128.444444444445]
Collect_MPObjValNHua =   [991.0, 1351.0, 1471.0]


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

~~~~~~~~~~judgeCount = 1, SPObj_SPF = 7120.444444444445
Vessel i: 0:     pi: 12-18,     ai-di: 2-15,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 2-15,     taoi-deltai: 2-15,     taoPi_SP-deltaPi_SP: 2-15,     betaNi: 13,     bi: 13
Vessel i: 1:     pi: 6-12,     ai-di: 14-36,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 14-36,     taoi-deltai: 14-37,     taoPi_SP-deltaPi_SP: 14-37,     betaNi: 23,     bi: 23
Vessel i: 2:     pi: 18-25,     ai-di: 14-25,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 14-25,     taoi-deltai: 14-21,     taoPi_SP-deltaPi_SP: 14-21,     betaNi: 7,     bi: 7
Vessel i: 3:     pi: 12-17,     ai-di: 20-44,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 20-44,     taoi-deltai: 20-41,     taoPi_SP-deltaPi_SP: 20-41,     betaNi: 21,     bi: 21
Vessel i: 4:     pi: 17-24,     ai-di: 24-30,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 24-30,     taoi-deltai: 24-29,     taoPi_SP-deltaPi_SP: 24-29,     betaNi: 5,     bi: 5
Vessel i: 5:     pi: 17-23,     ai-di: 29-48,     gi_SP-gpi_SP: 0.200000-1.000000,     ai_SP-di: 30-48,     taoi-deltai: 32-50,     taoPi_SP-deltaPi_SP: 32-50,     betaNi: 18,     bi: 18
Vessel i: 6:     pi: 9-15,     ai-di: 34-63,     gi_SP-gpi_SP: 1.000000-0.600000,     ai_SP-di: 42-63,     taoi-deltai: 42-71,     taoPi_SP-deltaPi_SP: 42-71,     betaNi: 29,     bi: 29
Vessel i: 7:     pi: 28-34,     ai-di: 34-43,     gi_SP-gpi_SP: 0.800000-0.400000,     ai_SP-di: 42-43,     taoi-deltai: 38-45,     taoPi_SP-deltaPi_SP: 42-45,     betaNi: 7,     bi: 7
Vessel i: 8:     pi: 28-34,     ai-di: 47-66,     gi_SP-gpi_SP: 0.000000-1.000000,     ai_SP-di: 47-66,     taoi-deltai: 47-67,     taoPi_SP-deltaPi_SP: 47-67,     betaNi: 20,     bi: 20
Vessel i: 9:     pi: 17-23,     ai-di: 50-68,     gi_SP-gpi_SP: 1.000000-0.000000,     ai_SP-di: 57-68,     taoi-deltai: 57-74,     taoPi_SP-deltaPi_SP: 57-74,     betaNi: 17,     bi: 17

round LB =   [991, 7917, 8591]
round UB =   [14124, 8471, 8471]
round Hua =   [0, 6566, 7120]
round SPObjVal =   [6566, 7120, 7128]
round MPObjValNHua =   [991, 1351, 1471]

OptimalObj = 8591.444444444445
Time: 334.000000
```