```
"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=23171

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 0.001
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 470971 rows, 40692 columns and 1298017 nonzeros
Model fingerprint: 0xa6ab77b9
Variable types: 1 continuous, 40691 integer (40663 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 263445 rows and 16395 columns (presolve time = 5s) ...
Presolve removed 408819 rows and 27112 columns
Presolve time: 10.01s
Presolved: 62152 rows, 13580 columns, 205681 nonzeros
Variable types: 0 continuous, 13580 integer (13561 binary)

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

Root relaxation presolved: 13580 rows, 75732 columns, 219261 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    9.3400000e+02   0.000000e+00   1.101750e+03     11s
Concurrent spin time: 0.00s

Solved with dual simplex (primal model)

Root relaxation: objective 9.340000e+02, 2784 iterations, 0.41 seconds (0.34 work units)

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

     0     0  934.00000    0   16          -  934.00000      -     -   12s
H    0     0                2494.0000000  934.00000  62.6%     -   12s
     0     0  934.00000    0  122 2494.00000  934.00000  62.6%     -   14s
H    0     0                1854.0000000  934.00000  49.6%     -   14s
     0     0  934.00000    0   23 1854.00000  934.00000  49.6%     -   16s
     0     0  934.00000    0   40 1854.00000  934.00000  49.6%     -   16s
     0     0  934.00000    0   29 1854.00000  934.00000  49.6%     -   17s
     0     0  934.00000    0   21 1854.00000  934.00000  49.6%     -   19s
     0     0  934.00000    0   30 1854.00000  934.00000  49.6%     -   19s
     0     0  934.00000    0   35 1854.00000  934.00000  49.6%     -   21s
     0     0  934.00000    0   28 1854.00000  934.00000  49.6%     -   22s
     0     2  934.00000    0   11 1854.00000  934.00000  49.6%     -   25s
    27    29 1534.00000    7   43 1854.00000  934.00000  49.6%  1187   30s
    36    38 1534.00000    9   68 1854.00000  934.00000  49.6%  1656   35s
H   61    54                1534.0000000  934.00000  39.1%  1419   38s
    82    61     cutoff   24      1534.00000  934.00000  39.1%  1311   41s
*  111    74              21     934.0000000  934.00000  0.00%  1368   44s

Cutting planes:
  Gomory: 4
  Lift-and-project: 1
  Cover: 56
  Implied bound: 1754
  Clique: 3
  MIR: 24
```

```
  StrongCG: 12
  GUB cover: 4
  Zero half: 2
  RLT: 5
  Relax-and-lift: 12
  BQP: 1

Explored 134 nodes (224788 simplex iterations) in 44.77 seconds (66.52 work units)
Thread count was 8 (of 8 available processors)

Solution count 4: 934 1534 1854 2494

Optimal solution found (tolerance 1.00e-03)
Best objective 9.340000000000e+02, best bound 9.340000000000e+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 335507 rows, 11221 columns and 691066 nonzeros
Model fingerprint: 0x75fb9b69
Variable types: 28 continuous, 11193 integer (6468 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 331882 rows and 9902 columns
Presolve time: 0.34s
Presolved: 3625 rows, 1319 columns, 9793 nonzeros
Variable types: 6 continuous, 1313 integer (736 binary)
Found heuristic solution: objective 4809.0372767

Root relaxation: objective 6.197593e+03, 1267 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

H    0     0                    6197.5928323 14106.7778   128%     -    0s
     0     0        -    0      6197.59283 6197.59283  0.00%     -    0s

Explored 1 nodes (1534 simplex iterations) in 0.47 seconds (0.62 work units)
Thread count was 8 (of 8 available processors)

Solution count 2: 6197.59 4809.04

Optimal solution found (tolerance 1.00e-08)
Best objective 6.197592832254e+03, best bound 6.197592832254e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□6197

 Itr = 0
Collect_LB =   [934.0]
Collect_UB =   [13329.18566450719]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [6197.592832253595]
Collect_MPObjValNHua =   [934.0]


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 475929 rows, 180636 columns and 1302996 nonzeros
Model fingerprint: 0xd4d18ad6
Variable types: 1 continuous, 180635 integer (180607 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 309948 rows and 162342 columns (presolve time = 5s) ...
Presolve removed 452041 rows and 173120 columns
```

```
Presolve time: 9.99s
Presolved: 23888 rows, 7516 columns, 99924 nonzeros
Variable types: 0 continuous, 7516 integer (7499 binary)

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.2490928e+03   1.008500e+03   0.000000e+00     10s
    5364    7.2490928e+03   0.000000e+00   0.000000e+00     11s

Root relaxation: objective 7.249093e+03, 5364 iterations, 0.31 seconds (0.48 work units)

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

     0     0 7249.09283    0   28          - 7249.09283      -     -   10s
     0     0 7249.09283    0  198          - 7249.09283      -     -   12s
     0     0 7249.09283    0  189          - 7249.09283      -     -   12s
     0     0 7249.09283    0  514          - 7249.09283      -     -   13s
     0     0 7249.09283    0  344          - 7249.09283      -     -   13s
     0     0 7249.09283    0   86          - 7249.09283      -     -   15s
     0     0 7249.09283    0  451          - 7249.09283      -     -   17s
     0     0 7249.09283    0  447          - 7249.09283      -     -   17s
     0     0 7249.09283    0  320          - 7249.09283      -     -   21s
     0     0 7249.09283    0  240          - 7249.09283      -     -   21s
H    0     0                 9809.0928323 7249.09283  26.1%     -   21s
     0     0 7249.09283    0  240 9809.09283 7249.09283  26.1%     -   22s
H    0     0                 9289.0928323 7249.09283  22.0%     -   23s
H    0     0                 7249.0928323 7249.09283  0.00%     -   27s
     0     0 7249.09283    0  240 7249.09283 7249.09283  0.00%     -   27s

Cutting planes:
  Gomory: 5
  Cover: 385
  Implied bound: 234
  Clique: 505
  MIR: 137
  StrongCG: 108
  GUB cover: 16
  Zero half: 7
  RLT: 6
  Relax-and-lift: 105
  BQP: 7

Explored 1 nodes (54945 simplex iterations) in 27.14 seconds (32.63 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 7249.09 9289.09 9809.09

Optimal solution found (tolerance 5.00e-02)
Best objective 7.249092832254e+03, best bound 7.249092832254e+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 335507 rows, 11221 columns and 691066 nonzeros
Model fingerprint: 0x76629b07
Variable types: 28 continuous, 11193 integer (6468 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 330257 rows and 9402 columns
Presolve time: 0.39s
Presolved: 5250 rows, 1819 columns, 14161 nonzeros
Variable types: 6 continuous, 1813 integer (1000 binary)
Found heuristic solution: objective 4319.8009842

Root relaxation: objective 6.362711e+03, 1839 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 6362.71111    0   85 4319.80098 6362.71111  47.3%     -    0s
H    0     0                 4859.1111111 6362.71111  30.9%     -    0s
H    0     0                 5963.6753691 6362.71111  6.69%     -    0s
H    0     0                 6039.0364802 6362.11111  5.35%     -    0s
```

```
248      0    0 6362.11111    0   27 6039.03648 6362.11111  5.35%    -    0s
249  H   0    0                6047.1111111 6362.11111  5.21%    -    0s
250  H   0    0                6357.0364802 6362.11111  0.08%    -    0s
251  H   0    0                6358.5364802 6362.11111  0.06%    -    0s
252      0    0 6362.11111    0   20 6358.53648 6362.11111  0.06%    -    0s
253      0    0 6362.11111    0   12 6358.53648 6362.11111  0.06%    -    0s
254      0    0 6362.11111    0   14 6358.53648 6362.11111  0.06%    -    0s
255  H   0    0                6362.1111111 6362.11111  0.00%    -    0s
256      0    0 6362.11111    0   14 6362.11111 6362.11111  0.00%    -    0s
257
258  Explored 1 nodes (3372 simplex iterations) in 0.78 seconds (0.72 work units)
259  Thread count was 8 (of 8 available processors)
260
261  Solution count 8: 6362.11 6358.54 6357.04 ... 4319.8
262
263  Optimal solution found (tolerance 1.00e-08)
264  Best objective 6.362111111111e+03, best bound 6.362111111111e+03, gap 0.0000%
265  SP is solved
266  SP's optimal solution is'□6362
267
268   Itr = 1
269  Collect_LB =   [934.0, 7249.092832253595]
270  Collect_UB =   [13329.18566450719, 7413.611111111113]
271  Collect_Hua =   [0.0, 6197.592832253595]
272  Collect_SPObjVal =   [6197.592832253595, 6362.111111111113]
273  Collect_MPObjValNHua =   [934.0, 1051.5]
274
275
276  Set parameter MIPGap to value 0.05
277  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
278
279  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
280  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
281
282  Optimize a model with 475929 rows, 180636 columns and 1302996 nonzeros
283  Model fingerprint: 0x81d2b88a
284  Variable types: 1 continuous, 180635 integer (180607 binary)
285  Coefficient statistics:
286    Matrix range     [1e+00, 1e+10]
287    Objective range  [1e+00, 2e+01]
288    Bounds range     [1e+00, 1e+00]
289    RHS range        [1e+00, 2e+10]
290  Warning: Model contains large matrix coefficients
291  Warning: Model contains large rhs
292           Consider reformulating model or setting NumericFocus parameter
293           to avoid numerical issues.
294  Presolve removed 310557 rows and 162407 columns (presolve time = 5s) ...
295  Presolve removed 452238 rows and 173142 columns
296  Presolve time: 9.88s
297  Presolved: 23691 rows, 7494 columns, 99364 nonzeros
298  Variable types: 0 continuous, 7494 integer (7477 binary)
299
300  Root simplex log...
301
302  Iteration    Objective       Primal Inf.    Dual Inf.      Time
303         0    7.3911111e+03   1.008500e+03   0.000000e+00     10s
304      5163    7.3911111e+03   0.000000e+00   0.000000e+00     10s
305
306  Root relaxation: objective 7.391111e+03, 5163 iterations, 0.25 seconds (0.35 work units)
307
308      Nodes    |    Current Node    |     Objective Bounds      |     Work
309   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
310
311      0     0 7391.11111    0   26          - 7391.11111      -     -   10s
312      0     0 7391.11111    0  266          - 7391.11111      -     -   12s
313      0     0 7391.11111    0   81          - 7391.11111      -     -   12s
314      0     0 7391.11111    0  511          - 7391.11111      -     -   13s
315      0     0 7391.11111    0   26          - 7391.11111      -     -   15s
316      0     0 7391.11111    0  186          - 7391.11111      -     -   16s
317      0     0 7391.11111    0  171          - 7391.11111      -     -   16s
318      0     0 7391.11111    0  233          - 7391.11111      -     -   17s
319      0     0 7391.11111    0  213          - 7391.11111      -     -   17s
320      0     0 7391.11111    0  264          - 7391.11111      -     -   22s
321      0     0 7391.11111    0  414          - 7391.11111      -     -   23s
322      0     0 7391.11111    0  413          - 7391.11111      -     -   23s
323      0     0 7391.11111    0  200          - 7391.11111      -     -   26s
324      0     0 7391.11111    0  187          - 7391.11111      -     -   26s
325      0     0 7391.11111    0  182          - 7391.11111      -     -   27s
326      0     2 7391.11111    0  150          - 7391.11111      -     -   32s
327      3     8 7391.11111    2  316          - 7391.11111      -  4908   35s
328     34    33 7391.11111    9  715          - 7391.11111      -  2152   40s
329     73    83 7391.11111   15  298          - 7391.11111      -  2147   47s
330    123   130 7391.11111   30  247          - 7391.11111      -  1646   50s
331    346   316 7391.11111   65  215          - 7391.11111      -   691   55s
```

```
332     832   824 7391.11111  133  237         - 7391.11111     -  325   62s
333    1158  1107 7391.11111  153  253         - 7391.11111     -  259   65s
334    1618  1108 8631.11111  209  511         - 7391.11111     -  199   80s
335    1621  1110 8591.11111  377  436         - 7391.11111     -  199   86s
336    1623  1111 8711.11111  142  258         - 7391.11111     -  199   96s
337    1624  1112 7391.11111   81  360         - 7391.11111     -  199  100s
338    1625  1113 8591.11111  244  413         - 7391.11111     -  199  105s
339    1626  1113 8591.11111  393  762         - 7391.11111     -  198  112s
340    1627  1114 8631.11111  362  555         - 7391.11111     -  198  120s
341    1629  1115 8631.11111  302  527         - 7391.11111     -  198  129s
342    1630  1116 8591.11111  375  698         - 7391.11111     -  198  132s
343    1631  1117 8650.05848  348  654         - 7391.11111     -  198  139s
344    1632  1117 8651.11111  145  777         - 7391.11111     -  198  142s
345    1633  1118 7671.11111  199  394         - 7391.11111     -  198  151s
346    1634  1119 8671.11111  169  726         - 7391.11111     -  197  155s
347    1635  1119 7391.11111   71  617         - 7391.11111     -  197  162s
348    1636  1120 8631.11111  305  862         - 7391.11111     -  197  166s
349    1637  1121 8591.11111  376  571         - 7391.11111     -  197  171s
350    1639  1122 8631.11111  376  633         - 7391.11111     -  197  182s
351    1640  1123 7819.11111  147  601         - 7391.11111     -  197  185s
352    1641  1123 8791.11111  166  601         - 7391.11111     -  197  196s
353    1642  1127 7391.11111   14  563         - 7391.11111     -  355  201s
354    1648  1133 7391.11111   16  576         - 7391.11111     -  364  205s
355    1656  1138 7391.11111   17  567         - 7391.11111     -  382  210s
356    1660  1141 7405.45679   17 2251         - 7391.11111     -  407  219s
357    1664  1144 7391.11111   18  619         - 7391.11111     -  424  227s
358    1668  1147 7539.46360   18  735         - 7391.11111     -  430  230s
359    1678  1154 7539.46360   19 1039         - 7391.11111     -  453  237s
360  H 1680  1096                    8111.1111111 7391.11111  8.88%   455  237s
361  H 1683  1037                    8071.1111111 7391.11111  8.43%   456  240s
362    1690  1034 7391.11111   20  624 8071.11111 7391.11111  8.43%   473  246s
363    1707  1039 7411.11111   22 1024 8071.11111 7391.11111  8.43%   499  252s
364    1725  1049 7391.49866   23 1147 8071.11111 7391.11111  8.43%   508  256s
365    1739  1049 infeasible   24      8071.11111 7391.11111  8.43%   534  260s
366  * 1745   996              34    7931.1111111 7391.11111  6.81%   537  260s
367  H 1755   946                    7491.1111111 7391.11111  1.33%   545  263s
368
369  Cutting planes:
370    Gomory: 6
371    Cover: 252
372    Implied bound: 104
373    Projected implied bound: 27
374    Clique: 63
375    MIR: 37
376    StrongCG: 11
377    Flow cover: 36
378    GUB cover: 37
379    Zero half: 6
380    RLT: 9
381    Relax-and-lift: 34
382    BQP: 7
383
384  Explored 1756 nodes (974487 simplex iterations) in 263.26 seconds (386.93 work units)
385  Thread count was 8 (of 8 available processors)
386
387  Solution count 4: 7491.11 7931.11 8071.11 8111.11
388
389  Optimal solution found (tolerance 5.00e-02)
390  Best objective 7.491111111111e+03, best bound 7.391111111111e+03, gap 1.3349%
391  Set parameter MIPGap to value 1e-08
392  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
393
394  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
395  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
396
397  Optimize a model with 335507 rows, 11221 columns and 691066 nonzeros
398  Model fingerprint: 0xf43a45ef
399  Variable types: 28 continuous, 11193 integer (6468 binary)
400  Coefficient statistics:
401    Matrix range     [1e-01, 1e+10]
402    Objective range  [6e-05, 5e+01]
403    Bounds range     [1e+00, 1e+00]
404    RHS range        [8e-01, 1e+10]
405  Warning: Model contains large matrix coefficients
406  Warning: Model contains large rhs
407          Consider reformulating model or setting NumericFocus parameter
408          to avoid numerical issues.
409  Presolve removed 330345 rows and 9409 columns
410  Presolve time: 0.38s
411  Presolved: 5162 rows, 1812 columns, 13941 nonzeros
412  Variable types: 6 continuous, 1806 integer (995 binary)
413  Found heuristic solution: objective 3792.0695601
414  Found heuristic solution: objective 3839.0695601
415
```

```
Root relaxation: objective 6.385778e+03, 2092 iterations, 0.05 seconds (0.02 work units)

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

*    0     0               0    6385.7777778 6385.77778  0.00%     -    0s

Explored 1 nodes (2864 simplex iterations) in 0.59 seconds (0.62 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 6385.78 3839.07 3792.07

Optimal solution found (tolerance 1.00e-08)
Best objective 6.385777777778e+03, best bound 6.385777777778e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□6385

 Itr = 2
Collect_LB =   [934.0, 7249.092832253595, 7491.111111111113]
Collect_UB =   [13329.18566450719, 7413.611111111113, 7413.611111111113]
Collect_Hua =   [0.0, 6197.592832253595, 6362.111111111113]
Collect_SPObjVal =   [6197.592832253595, 6362.111111111113, 6385.777777777777]
Collect_MPObjValNHua =   [934.0, 1051.5, 1129.0]


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

~~~~~~~~~~judgeCount = 1, SPObj_SPF = 6362.111111111113
Vessel i: 0:     pi: 0-6,     ai-di: 5-31,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 5-31,     taoi-deltai: 5-31,     taoPi_SP-deltaPi_SP: 5-31,     betaNi: 26
,     bi: 26
Vessel i: 1:     pi: 14-21,     ai-di: 10-36,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 10-36,     taoi-deltai: 10-33,     taoPi_SP-deltaPi_SP: 10-33,
betaNi: 23,     bi: 23
Vessel i: 2:     pi: 7-14,     ai-di: 14-42,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 14-42,     taoi-deltai: 14-36,     taoPi_SP-deltaPi_SP: 14-36,     betaNi
: 22,     bi: 22
Vessel i: 3:     pi: 28-34,     ai-di: 17-31,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 17-31,     taoi-deltai: 17-31,     taoPi_SP-deltaPi_SP: 17-31,
betaNi: 14,     bi: 14
Vessel i: 4:     pi: 21-26,     ai-di: 24-45,     gi_SP-gpi_SP: 0.450000-0.000000,     ai_SP-di: 26-45,     taoi-deltai: 29-46,     taoPi_SP-deltaPi_SP: 29-46,
betaNi: 17,     bi: 17
Vessel i: 5:     pi: 14-20,     ai-di: 35-55,     gi_SP-gpi_SP: 0.750000-0.800000,     ai_SP-di: 41-55,     taoi-deltai: 38-52,     taoPi_SP-deltaPi_SP: 41-52,
betaNi: 14,     bi: 14
Vessel i: 6:     pi: 27-34,     ai-di: 40-72,     gi_SP-gpi_SP: 0.600000-1.000000,     ai_SP-di: 46-72,     taoi-deltai: 46-76,     taoPi_SP-deltaPi_SP: 46-76,
betaNi: 30,     bi: 30

round LB =   [934, 7249, 7491]
round UB =   [13329, 7414, 7414]
round Hua =   [0, 6198, 6362]
round SPObjVal =   [6198, 6362, 6386]
round MPObjValNHua =   [934, 1052, 1129]

OptimalObj = 7491.111111111113
Time: 406.000000
```