```
"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=49713

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 543655 rows, 46641 columns and 1499735 nonzeros
Model fingerprint: 0x93443863
Variable types: 1 continuous, 46640 integer (46608 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 364125 rows and 24742 columns (presolve time = 5s) ...
Presolve removed 488817 rows and 33971 columns
Presolve time: 6.95s
Presolved: 54838 rows, 12670 columns, 188803 nonzeros
Variable types: 0 continuous, 12670 integer (12646 binary)

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

Root relaxation presolved: 54833 rows, 12675 columns, 188788 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    9.1900000e+02   8.650000e+01   1.965148e+08      7s
Concurrent spin time: 0.00s

Solved with dual simplex (primal model)

Root relaxation: objective 7.790000e+02, 2314 iterations, 0.25 seconds (0.22 work units)

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

     0     0  779.00000    0   40          -  779.00000      -     -    7s
H    0     0                5139.0000000  779.00000  84.8%     -    8s
H    0     0                4979.0000000  779.00000  84.4%     -    8s
H    0     0                2479.0000000  779.00000  68.6%     -    8s
     0     0  779.00000    0  195 2479.00000  779.00000  68.6%     -    8s
     0     0  779.00000    0   89 2479.00000  779.00000  68.6%     -    8s
H    0     0                2359.0000000  779.00000  67.0%     -    8s
H    0     0                2139.0000000  779.00000  63.6%     -    8s
H    0     0                1479.0000000  779.00000  47.3%     -    8s
     0     0  779.00000    0   90 1479.00000  779.00000  47.3%     -    8s
H    0     0                1439.0000000  779.00000  45.9%     -   10s
     0     0  779.00000    0   10 1439.00000  779.00000  45.9%     -   10s
     0     0  779.00000    0   18 1439.00000  779.00000  45.9%     -   11s
     0     0  779.00000    0   18 1439.00000  779.00000  45.9%     -   11s
     0     0  779.00000    0   36 1439.00000  779.00000  45.9%     -   12s
     0     0  779.00000    0   64 1439.00000  779.00000  45.9%     -   12s
     0     0  779.00000    0   53 1439.00000  779.00000  45.9%     -   12s
H    0     0                779.0000000  779.00000  0.00%     -   13s
     0     0  779.00000    0   22  779.00000  779.00000  0.00%     -   13s

Cutting planes:
  Gomory: 2
  Cover: 275
  Implied bound: 882
  Clique: 19
```

```
  MIR: 49
  StrongCG: 27
  GUB cover: 8
  Zero half: 2
  RLT: 17
  Relax-and-lift: 18
  BQP: 9
  PSD: 1

Explored 1 nodes (25963 simplex iterations) in 13.42 seconds (21.52 work units)
Thread count was 8 (of 8 available processors)

Solution count 8: 779 1439 1479 ... 5139

Optimal solution found (tolerance 1.00e-10)
Best objective 7.790000000000e+02, best bound 7.790000000000e+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 1983493 rows, 1559473 columns and 13694306 nonzeros
Model fingerprint: 0x6dd88b20
Variable types: 766961 continuous, 792512 integer (787112 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 1981217 rows and 1558646 columns
Presolve time: 4.23s
Presolved: 2276 rows, 827 columns, 6068 nonzeros
Variable types: 6 continuous, 821 integer (486 binary)
Found heuristic solution: objective 3611.0215813

Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0    7.6070000e+03   2.825420e+03   0.000000e+00      5s
     637    5.0405771e+03   0.000000e+00   0.000000e+00      5s

Root relaxation: objective 5.040577e+03, 637 iterations, 0.00 seconds (0.00 work units)

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

     0     0 5040.57714    0    8 3611.02158 5040.57714  39.6%     -    5s
H    0     0                    4980.5771368 5040.57714  1.20%     -    5s
H    0     0                    5010.5771368 5040.57714  0.60%     -    5s
H    0     0                    5028.5771368 5040.57714  0.24%     -    5s
*    0     0               0    5040.5771368 5040.57714  0.00%     -    5s

Cutting planes:
  Gomory: 1
  Cover: 4
  Implied bound: 1
  Clique: 9
  MIR: 1
  Zero half: 3
  RLT: 2
  Relax-and-lift: 2

Explored 1 nodes (982 simplex iterations) in 5.63 seconds (5.87 work units)
Thread count was 8 (of 8 available processors)

Solution count 5: 5040.58 5028.58 5010.58 ... 3611.02

Optimal solution found (tolerance 1.00e-08)
Best objective 5.040577136846e+03, best bound 5.040577136846e+03, gap 0.0000%
SP is solved
SP's optimal solution is'□5040

  Itr = 0
Collect_LB =   [779.0]
Collect_UB =   [10860.154273692304]
Collect_Hua =   [0.0]
Collect_SPObjVal =   [5040.577136846152]
Collect_MPObjValNHua =   [779.0]

```

```
164
165  Set parameter TimeLimit to value 12000
166  Set parameter MIPGap to value 0.0005
167  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
168
169  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
170  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
171
172  Optimize a model with 548214 rows, 229425 columns and 1504338 nonzeros
173  Model fingerprint: 0xd3702332
174  Variable types: 1 continuous, 229424 integer (229392 binary)
175  Coefficient statistics:
176    Matrix range     [1e+00, 1e+10]
177    Objective range  [1e+00, 2e+01]
178    Bounds range     [1e+00, 1e+00]
179    RHS range        [1e+00, 2e+10]
180  Warning: Model contains large matrix coefficients
181  Warning: Model contains large rhs
182           Consider reformulating model or setting NumericFocus parameter
183           to avoid numerical issues.
184  Presolve removed 409080 rows and 213250 columns (presolve time = 5s) ...
185  Presolve removed 507828 rows and 222586 columns
186  Presolve time: 6.94s
187  Presolved: 40386 rows, 6839 columns, 104525 nonzeros
188  Variable types: 0 continuous, 6839 integer (6815 binary)
189  Root relaxation presolved: 6839 rows, 47225 columns, 111364 nonzeros
190
191
192  Root simplex log...
193
194  Iteration    Objective       Primal Inf.    Dual Inf.      Time
195         0      handle free variables                         7s
196      5248    5.8395771e+03   0.000000e+00   0.000000e+00      8s
197      5248    5.8395771e+03   0.000000e+00   0.000000e+00      8s
198
199  Root relaxation: objective 5.839577e+03, 5248 iterations, 0.47 seconds (0.84 work units)
200
201      Nodes    |    Current Node    |     Objective Bounds      |     Work
202   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
203
204      0     0 5839.57714    0   11          - 5839.57714      -     -    7s
205      0     0 5839.57714    0  124          - 5839.57714      -     -    8s
206      0     0 5839.57714    0  135          - 5839.57714      -     -    8s
207  H   0     0                 7839.5771368 5839.57714  25.5%     -    8s
208      0     0 5839.57714    0   44 7839.57714 5839.57714  25.5%     -    8s
209      0     0 5839.57714    0   15 7839.57714 5839.57714  25.5%     -   10s
210  H   0     0                 6299.5771368 5839.57714  7.30%     -   10s
211      0     0 5839.57714    0   71 6299.57714 5839.57714  7.30%     -   10s
212      0     0 5839.57714    0  132 6299.57714 5839.57714  7.30%     -   10s
213      0     0 5839.57714    0  129 6299.57714 5839.57714  7.30%     -   10s
214      0     0 5839.57714    0  127 6299.57714 5839.57714  7.30%     -   10s
215      0     0 5839.57714    0  125 6299.57714 5839.57714  7.30%     -   10s
216      0     0 5839.57714    0  137 6299.57714 5839.57714  7.30%     -   10s
217      0     0 5839.57714    0  131 6299.57714 5839.57714  7.30%     -   10s
218      0     0 5839.57714    0   81 6299.57714 5839.57714  7.30%     -   11s
219      0     0 5839.57714    0  150 6299.57714 5839.57714  7.30%     -   11s
220      0     0 5839.57714    0  104 6299.57714 5839.57714  7.30%     -   11s
221      0     0 5839.57714    0  105 6299.57714 5839.57714  7.30%     -   11s
222      0     0 5839.57714    0  140 6299.57714 5839.57714  7.30%     -   12s
223      0     0 5839.57714    0  138 6299.57714 5839.57714  7.30%     -   12s
224      0     0 5839.57714    0  113 6299.57714 5839.57714  7.30%     -   12s
225      0     0 5839.57714    0   89 6299.57714 5839.57714  7.30%     -   12s
226      0     0 5839.57714    0   49 6299.57714 5839.57714  7.30%     -   13s
227  H   0     0                 5839.5771368 5839.57714  0.00%     -   14s
228      0     0 5839.57714    0   49 5839.57714 5839.57714  0.00%     -   14s
229
230  Cutting planes:
231    Learned: 3
232    Gomory: 2
233    Cover: 139
234    Implied bound: 19
235    Clique: 132
236    MIR: 25
237    StrongCG: 16
238    GUB cover: 9
239    Zero half: 16
240    RLT: 5
241    Relax-and-lift: 1
242    BQP: 7
243
244  Explored 1 nodes (41513 simplex iterations) in 14.28 seconds (22.64 work units)
245  Thread count was 8 (of 8 available processors)
246
247  Solution count 3: 5839.58 6299.58 7839.58
```

```
248
249  Optimal solution found (tolerance 5.00e-04)
250  Best objective 5.839577136846e+03, best bound 5.839577136846e+03, gap 0.0000%
251  Set parameter MIPGap to value 1e-08
252  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
253
254  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
255  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
256
257  Optimize a model with 1983493 rows, 1559473 columns and 13694306 nonzeros
258  Model fingerprint: 0x026351fc
259  Variable types: 766961 continuous, 792512 integer (787112 binary)
260  Coefficient statistics:
261    Matrix range     [1e-01, 1e+10]
262    Objective range  [6e-05, 5e+01]
263    Bounds range     [1e+00, 8e+01]
264    RHS range        [8e-01, 1e+10]
265  Warning: Model contains large matrix coefficients
266  Warning: Model contains large rhs
267           Consider reformulating model or setting NumericFocus parameter
268           to avoid numerical issues.
269  Presolve removed 1979129 rows and 1557979 columns
270  Presolve time: 4.04s
271  Presolved: 4364 rows, 1494 columns, 11603 nonzeros
272  Variable types: 6 continuous, 1488 integer (870 binary)
273  Found heuristic solution: objective 3698.4064055
274
275  Root simplex log...
276
277  Iteration    Objective       Primal Inf.    Dual Inf.      Time
278         0    9.8620000e+03   5.348047e+03   0.000000e+00      5s
279      1274    5.3251111e+03   0.000000e+00   0.000000e+00      5s
280
281  Root relaxation: objective 5.325111e+03, 1274 iterations, 0.00 seconds (0.01 work units)
282
283      Nodes    |    Current Node    |     Objective Bounds      |     Work
284   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
285
286  H    0     0                    5325.1111111 13319.7778   150%     -    5s
287       0     0         -    0      5325.11111 5325.11111  0.00%     -    5s
288
289  Explored 1 nodes (1726 simplex iterations) in 5.35 seconds (5.60 work units)
290  Thread count was 8 (of 8 available processors)
291
292  Solution count 2: 5325.11 3698.41
293
294  Optimal solution found (tolerance 1.00e-08)
295  Best objective 5.325111111111e+03, best bound 5.325111111111e+03, gap 0.0000%
296  SP is solved
297  SP's optimal solution is'□5325
298
299   Itr = 1
300  Collect_LB =   [779.0, 5839.577136846152]
301  Collect_UB =   [10860.154273692304, 6124.111111111111]
302  Collect_Hua =   [0.0, 5040.577136846152]
303  Collect_SPObjVal =   [5040.577136846152, 5325.111111111111]
304  Collect_MPObjValNHua =   [779.0, 799.0]
305
306
307  Set parameter TimeLimit to value 12000
308  Set parameter MIPGap to value 0.0005
309  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
310
311  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
312  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
313
314  Optimize a model with 548215 rows, 229425 columns and 1504355 nonzeros
315  Model fingerprint: 0x7603653e
316  Variable types: 1 continuous, 229424 integer (229392 binary)
317  Coefficient statistics:
318    Matrix range     [1e+00, 1e+10]
319    Objective range  [1e+00, 2e+01]
320    Bounds range     [1e+00, 1e+00]
321    RHS range        [1e+00, 2e+10]
322  Warning: Model contains large matrix coefficients
323  Warning: Model contains large rhs
324           Consider reformulating model or setting NumericFocus parameter
325           to avoid numerical issues.
326  Presolve removed 409081 rows and 213250 columns (presolve time = 5s) ...
327  Presolve removed 507829 rows and 222586 columns
328  Presolve time: 6.92s
329  Presolved: 40386 rows, 6839 columns, 104525 nonzeros
330  Variable types: 0 continuous, 6839 integer (6815 binary)
331  Root relaxation presolved: 6839 rows, 47225 columns, 111364 nonzeros
```

```
Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0      handle free variables                         7s
    5248    6.1241111e+03   0.000000e+00   0.000000e+00      8s
    5248    6.1241111e+03   0.000000e+00   0.000000e+00      8s

Root relaxation: objective 6.124111e+03, 5248 iterations, 0.49 seconds (0.84 work units)

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

     0     0 6124.11111    0   11          - 6124.11111      -     -    7s
     0     0 6124.11111    0  124          - 6124.11111      -     -    8s
     0     0 6124.11111    0  135          - 6124.11111      -     -    8s
H    0     0                8124.1111111 6124.11111  24.6%     -    9s
     0     0 6124.11111    0   44 8124.11111 6124.11111  24.6%     -    9s
     0     0 6124.11111    0   15 8124.11111 6124.11111  24.6%     -   10s
H    0     0                6584.1111111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0   71 6584.11111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0  132 6584.11111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0  129 6584.11111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0  127 6584.11111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0  125 6584.11111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0  137 6584.11111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0  131 6584.11111 6124.11111  6.99%     -   10s
     0     0 6124.11111    0   81 6584.11111 6124.11111  6.99%     -   11s
     0     0 6124.11111    0  150 6584.11111 6124.11111  6.99%     -   11s
     0     0 6124.11111    0  104 6584.11111 6124.11111  6.99%     -   11s
     0     0 6124.11111    0  105 6584.11111 6124.11111  6.99%     -   11s
     0     0 6124.11111    0  140 6584.11111 6124.11111  6.99%     -   12s
     0     0 6124.11111    0  138 6584.11111 6124.11111  6.99%     -   12s
     0     0 6124.11111    0  113 6584.11111 6124.11111  6.99%     -   12s
     0     0 6124.11111    0   89 6584.11111 6124.11111  6.99%     -   12s
     0     0 6124.11111    0   49 6584.11111 6124.11111  6.99%     -   13s
H    0     0                6124.1111111 6124.11111  0.00%     -   14s
     0     0 6124.11111    0   49 6124.11111 6124.11111  0.00%     -   14s

Cutting planes:
  Learned: 3
  Gomory: 2
  Cover: 139
  Implied bound: 19
  Clique: 132
  MIR: 25
  StrongCG: 16
  GUB cover: 9
  Zero half: 16
  RLT: 5
  Relax-and-lift: 1
  BQP: 7

Explored 1 nodes (41513 simplex iterations) in 14.38 seconds (22.64 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 6124.11 6584.11 8124.11

Optimal solution found (tolerance 5.00e-04)
Best objective 6.124111111111e+03, best bound 6.124111111111e+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 1983493 rows, 1559473 columns and 13694306 nonzeros
Model fingerprint: 0x026351fc
Variable types: 766961 continuous, 792512 integer (787112 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 1979129 rows and 1557979 columns
Presolve time: 4.11s
Presolved: 4364 rows, 1494 columns, 11603 nonzeros
Variable types: 6 continuous, 1488 integer (870 binary)
Found heuristic solution: objective 3698.4064055
```

```
416
417  Root simplex log...
418
419  Iteration    Objective       Primal Inf.    Dual Inf.      Time
420         0    9.8620000e+03   5.348047e+03   0.000000e+00      5s
421      1274    5.3251111e+03   0.000000e+00   0.000000e+00      5s
422
423  Root relaxation: objective 5.325111e+03, 1274 iterations, 0.01 seconds (0.01 work units)
424
425      Nodes    |    Current Node    |     Objective Bounds      |     Work
426   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
427
428  H    0     0                    5325.1111111 13319.7778   150%     -    5s
429       0     0        -    0      5325.11111 5325.11111  0.00%     -    5s
430
431  Explored 1 nodes (1726 simplex iterations) in 5.41 seconds (5.60 work units)
432  Thread count was 8 (of 8 available processors)
433
434  Solution count 2: 5325.11 3698.41
435
436  Optimal solution found (tolerance 1.00e-08)
437  Best objective 5.325111111111e+03, best bound 5.325111111111e+03, gap 0.0000%
438  SP is solved
439  SP's optimal solution is'□5325
440
441   Itr = 2
442  Collect_LB =   [779.0, 5839.577136846152, 6124.111111111111]
443  Collect_UB =   [10860.154273692304, 6124.111111111111, 6124.111111111111]
444  Collect_Hua =   [0.0, 5040.577136846152, 5325.111111111111]
445  Collect_SPObjVal =   [5040.577136846152, 5325.111111111111, 5325.111111111111]
446  Collect_MPObjValNHua =   [779.0, 799.0, 799.0]
447
448
449   Reach the termination conditions, stop iteration
450   Values adopted from the Itr' th iteration, and Itr = {2}, judgeCount = {2}
451
452  ~~~~~~~~~~judge = 2, SPObj_SPF = 5325.111111111111
453  Vessel i: 0:     pi: 0-6,     ai-di: 1-20,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 1-20,     taoi-deltai: 1-19,     taoPi_SP-deltaPi_SP: 4-19,     betaNi: 18
       ,     bi: 18
454  Vessel i: 1:     pi: 14-19,     ai-di: 7-14,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 7-14,     taoi-deltai: 7-12,     taoPi_SP-deltaPi_SP: 7-12,     betaNi: 5
       ,     bi: 5
455  Vessel i: 2:     pi: 7-14,     ai-di: 4-30,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 4-30,     taoi-deltai: 4-28,     taoPi_SP-deltaPi_SP: 4-28,     betaNi: 24
       ,     bi: 24
456  Vessel i: 3:     pi: 28-34,     ai-di: 7-20,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 7-20,     taoi-deltai: 7-18,     taoPi_SP-deltaPi_SP: 7-18,     betaNi: 11
       ,     bi: 11
457  Vessel i: 4:     pi: 14-20,     ai-di: 31-44,     gi_SP-gpi_SP: 0.000000-0.000000,     ai_SP-di: 31-44,     taoi-deltai: 31-42,     taoPi_SP-deltaPi_SP: 31-42,
       betaNi: 11,     bi: 11
458  Vessel i: 5:     pi: 24-29,     ai-di: 21-43,     gi_SP-gpi_SP: 0.000000-1.000000,     ai_SP-di: 21-43,     taoi-deltai: 21-27,     taoPi_SP-deltaPi_SP: 21-27,
       betaNi: 6,     bi: 6
459  Vessel i: 6:     pi: 15-22,     ai-di: 37-78,     gi_SP-gpi_SP: 1.000000-0.600000,     ai_SP-di: 45-78,     taoi-deltai: 45-79,     taoPi_SP-deltaPi_SP: 45-79,
       betaNi: 34,     bi: 34
460  Vessel i: 7:     pi: 22-28,     ai-di: 25-57,     gi_SP-gpi_SP: 0.800000-0.200000,     ai_SP-di: 33-57,     taoi-deltai: 33-46,     taoPi_SP-deltaPi_SP: 33-46,
       betaNi: 13,     bi: 13
461
462  round LB =   [779, 5840, 6124]
463  round UB =   [10860, 6124, 6124]
464  round Hua =   [0, 5041, 5325]
465  round SPObjVal =   [5041, 5325, 5325]
466  round MPObjValNHua =   [779, 799, 799]
467
468  OptimalObj = 6124.111111111111
469  Time: 407.000000
470
471
472
473
```