```
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=40126
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
 4
   6
   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
 8
   >>> runfile('E:/1 000/3 0000/1 00000/1 000000/1 000000/1 000000/1 LW 000/3 python_code/9 Code for this paper/main_RO_TWS.py', wdir='E:/1 0000/3 0000/1 000000/1 000000/1 000000/1 000000/1 LW 000/3 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
12
   Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
13
15
   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
16
17
   Optimize a model with 543655 rows, 46641 columns and 1499735 nonzeros
19
   Model fingerprint: 0x93443863
   Variable types: 1 continuous, 46640 integer (46608 binary)
20
21
   Coefficient statistics:
    Matrix range [1e+00, 1e+10]
    Objective range [1e+00, 2e+01]
23
24
    Bounds range [1e+00, 1e+00]
                 [1e+00, 2e+10]
    RHS range
26
   Warning: Model contains large matrix coefficients
27
   Warning: Model contains large rhs
28
        Consider reformulating model or setting NumericFocus parameter
29
        to avoid numerical issues.
   Presolve removed 364125 rows and 24742 columns (presolve time = 5s) ...
30
31
   Presolve removed 488817 rows and 33971 columns
   Presolve time: 7.13s
   Presolved: 54838 rows, 12670 columns, 188803 nonzeros
34
   Variable types: 0 continuous, 12670 integer (12646 binary)
35
   Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
   Showing first log only...
37
38
39
   Root relaxation presolved: 54833 rows, 12675 columns, 188788 nonzeros
40
41
42
   Root simplex log...
43
44
                       Primal Inf. Dual Inf.
   Iteration Objective
       0 9.1900000e+02 8.650000e+01 1.965148e+08
45
46
   Concurrent spin time: 0.00s
48
   Solved with dual simplex (primal model)
49
50
   Root relaxation: objective 7.790000e+02, 2314 iterations, 0.30 seconds (0.22 work units)
51
     Nodes | Current Node | Objective Bounds
52
                                                   Work
53
    Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
54
         0 779.00000 0 40
55
                                - 779.00000
                     5139.0000000 779.00000 84.8%
56
   H = 0 = 0
57
   Н
      0
                     4979.0000000 779.00000 84.4%
                     2479.0000000 779.00000 68.6%
58
   Η
59
         0 779.00000 0 195 2479.00000 779.00000 68.6%
                                                          9s
     0
         0\ 779.00000\ 0\ 89\ 2479.00000\ 779.00000\ 68.6\%
60
     0
61 H 0
                     2359.0000000 779.00000 67.0%
                     2139.0000000 779.00000 63.6%
62
   H = 0
63
                     1479 0000000 779 00000 47 3%
   Н
      0
          0
64
      0
        0 779.00000 0 90 1479.00000 779.00000 47.3%
                     1439.0000000 779.00000 45.9%
65
   H = 0
         0 779.00000 0 10 1439.00000 779.00000 45.9%
66
67
      0
         0 779.00000 0 18 1439.00000 779.00000 45.9%
                                                      - 13s
68
         0 779.00000 0 18 1439.00000 779.00000 45.9%
                                                       - 13s
         0 779.00000 0 36 1439.00000 779.00000 45.9%
69
                                                      - 14s
         0 779 00000 0 64 1439 00000 779 00000 45 9%
70
      0
                                                      - 14s
      0
         0 779.00000 0 53 1439.00000 779.00000 45.9%
                                                       - 14s
   H 0
                      779.0000000 779.00000 0.00%
73
        0 779.00000 0 22 779.00000 779.00000 0.00%
74
   Cutting planes:
75
76
    Gomory: 2
    Cover: 275
77
78
    Implied bound: 882
79
    Clique: 19
```

```
80
      MIR: 49
 81
      StrongCG: 27
      GUB cover: 8
 82
 83
      Zero half: 2
      RLT: 17
 85
      Relax-and-lift: 18
      BQP: 9
 86
 87
      PSD: 1
 88
 89 Explored 1 nodes (25963 simplex iterations) in 15.76 seconds (21.52 work units)
 90 Thread count was 8 (of 8 available processors)
    Solution count 8: 779 1439 1479 ... 5139
 93
 94 Optimal solution found (tolerance 1.00e-10)
    Best objective 7.790000000000e+02, best bound 7.79000000000e+02, gap 0.0000%
     Set parameter MIPGap to value 1e-08
 97
    Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
 98
 99 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
100 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
101
     Optimize a model with 430077 rows, 12824 columns and 883303 nonzeros
103 Model fingerprint: 0xb9c41de0
104 Variable types: 32 continuous, 12792 integer (7392 binary)
105 Coefficient statistics:
106 Matrix range [1e-01, 1e+10]
     Objective range [6e-05, 5e+01]
107
     Bounds range [1e+00, 1e+00]
108
     RHS range
109
                   [8e-01, 1e+10]
110 Warning: Model contains large matrix coefficients
111 Warning: Model contains large rhs
112
          Consider reformulating model or setting NumericFocus parameter
          to avoid numerical issues.
113
114 Presolve removed 427801 rows and 11997 columns
115 Presolve time: 0.30s
116 Presolved: 2276 rows, 827 columns, 6068 nonzeros
117 Variable types: 6 continuous, 821 integer (486 binary)
118 Found heuristic solution: objective 3611.0215813
119
120 Root relaxation: objective 5.040577e+03, 637 iterations, 0.02 seconds (0.00 work units)
121
122
       Nodes | Current Node | Objective Bounds
                                                      Work
123
     Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
124
       0 0 5040.57714 0 8 3611.02158 5040.57714 39.6% - 0s
125
                         4980.5771368 5040.57714 1.20% - 0s
126 H 0 0
127 H 0 0
                         5010.5771368 5040.57714 0.60%
                                                              0s
                         5028.5771368 5040.57714 0.24%
128 H 0 0
                                                          - 0s
129 *
       0 0
                     0 5040.5771368 5040.57714 0.00%
130
131 Cutting planes:
132
     Gomory: 1
133
      Cover: 4
134
      Implied bound: 1
      Clique: 9
135
      MIR: 1
136
137
      Zero half: 3
138
      RLT: 2
139
      Relax-and-lift: 2
140
141 Explored 1 nodes (982 simplex iterations) in 0.44 seconds (0.61 work units)
142 Thread count was 8 (of 8 available processors)
143
144 Solution count 5: 5040.58 5028.58 5010.58 ... 3611.02
145
146 Optimal solution found (tolerance 1.00e-08)
147 Best objective 5.040577136846e+03, best bound 5.040577136846e+03, gap 0.0000%
148 SP is solved
149 SP's optimal solution is' □ 5040
150
151 Itr = 0
152 Collect_LB = [779.0]
153 Collect UB = [10860.154273692304]
154 Collect_Hua = [0.0]
155 Collect SPObjVal = [5040.577136846152]
156 Collect_MPObjValNHua = [779.0]
157
158
159 Set parameter MIPGap to value 1e-10
160 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
161
162 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
163
```

```
164
165 Optimize a model with 548213 rows, 229425 columns and 1504321 nonzeros
166 Model fingerprint: 0x8473f465
167
    Variable types: 1 continuous, 229424 integer (229392 binary)
168 Coefficient statistics:
     Matrix range [1e+00, 1e+10]
169
170
     Objective range [1e+00, 2e+01]
171
     Bounds range [1e+00, 1e+00]
172
     RHS range
                  [1e+00, 2e+10]
    Warning: Model contains large matrix coefficients
173
    Warning: Model contains large rhs
174
175
         Consider reformulating model or setting NumericFocus parameter
176
         to avoid numerical issues.
177 Presolve removed 409079 rows and 213250 columns (presolve time = 5s) ...
178 Presolve removed 507827 rows and 222586 columns
179 Presolve time: 7.49s
180 Presolved: 40386 rows, 6839 columns, 104525 nonzeros
181 Variable types: 0 continuous, 6839 integer (6815 binary)
182 Root relaxation presolved: 6839 rows, 47225 columns, 111364 nonzeros
183
184
185 Root simplex log...
186
187 Iteration Objective
                         Primal Inf. Dual Inf.
                                              Time
188
       0
           handle free variables
189
      5248 5.8395771e+03 0.000000e+00 0.000000e+00
      5248 \quad 5.8395771e + 03 \quad 0.000000e + 00 \quad 0.000000e + 00
190
191
192 Root relaxation: objective 5.839577e+03, 5248 iterations, 0.50 seconds (0.84 work units)
193
194
      Nodes | Current Node | Objective Bounds
                                                     Work
195
     Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
196
          0.5839.57714 \quad 0 \quad 11
197
                                 - 5839.57714
198
       0
          0 5839.57714 0 124
                                  - 5839.57714
199
                                  - 5839 57714
       0
          0 5839.57714 0 135
200 H 0 0
                      7839.5771368 5839.57714 25.5% -
       0 0 5839.57714 0 44 7839.57714 5839.57714 25.5%
201
       0 \quad 0.5839.57714 \quad 0 \quad 15.7839.57714.5839.57714.25.5\%
202
203 H 0 0
                      6299.5771368 5839.57714 7.30% - 11s
204
       0 0 5839.57714 0 71 6299.57714 5839.57714 7.30% - 11s
205
          0 5839.57714 0 132 6299.57714 5839.57714 7.30%
       0
                                                           - 12s
206
          0.5839 57714 0.129 6299 57714 5839 57714 7.30%
                                                          - 12s
       0
207
         - 12s
          0.5839.57714 \quad 0.125\ 6299.57714\ 5839.57714\ 7.30\%
208
                                                           - 12s
          0 5839.57714 0 137 6299.57714 5839.57714 7.30%
209
       0
                                                          - 12s
          0 5839.57714 0 131 6299.57714 5839.57714 7.30%
210
                                                          - 12s
211
       0
          0 5839.57714 0 150 6299.57714 5839.57714 7.30%
212
                                                           - 13s
          0 5839.57714 0 104 6299.57714 5839.57714 7.30%
213
       0
                                                          - 13s
214
       0
          0 5839.57714 0 105 6299.57714 5839.57714 7.30%
                                                          - 13s
          215
          216
       0
                                                           - 13s
          0.5839.57714 0.113.6299.57714.5839.57714.7.30%
217
       0
                                                          - 14s
218
          - 14s
219
          0 5839.57714 0 49 6299.57714 5839.57714 7.30%
       0
                                                          - 15s
220 H 0 0
                     5839.5771368 5839.57714 0.00% - 16s
       0 0 5839.57714 0 49 5839.57714 5839.57714 0.00%
221
222
223 Cutting planes:
224
     Learned: 3
225
     Gomory: 2
226
     Cover: 139
227
     Implied bound: 19
228
     Clique: 132
229
     MIR: 25
230
     StrongCG: 16
231
     GUB cover: 9
232
     Zero half: 16
233
     RLT: 5
234
     Relax-and-lift: 1
235
     BQP: 7
236
237 Explored 1 nodes (41513 simplex iterations) in 16.51 seconds (22.64 work units)
238 Thread count was 8 (of 8 available processors)
239
240 Solution count 3: 5839.58 6299.58 7839.58
241
242 Optimal solution found (tolerance 1.00e-10)
243 Best objective 5.839577136846e+03, best bound 5.839577136846e+03, gap 0.0000%
244 Set parameter MIPGap to value 1e-08
245 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
246
    CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
247
```

```
248 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
249
250 Optimize a model with 430077 rows, 12824 columns and 883303 nonzeros
251 Model fingerprint: 0x11cbd79b
252 Variable types: 32 continuous, 12792 integer (7392 binary)
253 Coefficient statistics:
254 Matrix range [1e-01, 1e+10]
255 Objective range [6e-05, 5e+01]
     Bounds range [1e+00, 1e+00]
256
257
                   [8e-01, 1e+10]
     RHS range
258 Warning: Model contains large matrix coefficients
259
    Warning: Model contains large rhs
260
          Consider reformulating model or setting NumericFocus parameter
          to avoid numerical issues.
261
262 Presolve removed 425713 rows and 11330 columns
263 Presolve time: 0.33s
264 Presolved: 4364 rows, 1494 columns, 11603 nonzeros
265 Variable types: 6 continuous, 1488 integer (870 binary)
266 Found heuristic solution: objective 3698.4064055
267
268 Root relaxation: objective 5.325111e+03, 1274 iterations, 0.02 seconds (0.01 work units)
269
270
       Nodes | Current Node | Objective Bounds
     Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
271
272
273 H 0 0
                         5325.1111111 13319.7778 150% - 0s
274
                        5325.11111 5325.11111 0.00% - 0s
                  - 0
275
276 Explored 1 nodes (1726 simplex iterations) in 0.49 seconds (0.64 work units)
277 Thread count was 8 (of 8 available processors)
278
279 Solution count 2: 5325.11 3698.41
280
281 Optimal solution found (tolerance 1.00e-08)
282 Best objective 5.3251111111111e+03, best bound 5.325111111111e+03, gap 0.0000%
283 SP is solved
284 SP's optimal solution is' ☐ 5325
285
286 	 Itr = 1
287 Collect_LB = [779.0, 5839.577136846152]
288 Collect_UB = [10860.154273692304, 6124.11111111111]
289 Collect Hua = [0.0, 5040.577136846152]
290 Collect SPObjVal = [5040.577136846152, 5325.11111111111]
291 Collect_MPObjValNHua = [779.0, 799.0]
292
293
294 Set parameter MIPGap to value 1e-10
295 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
296
297 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
298 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
299
300 Optimize a model with 548213 rows, 229425 columns and 1504321 nonzeros
301 Model fingerprint: 0x930c8a0b
302 Variable types: 1 continuous, 229424 integer (229392 binary)
303 Coefficient statistics:
304 Matrix range [1e+00, 1e+10]
305
     Objective range [1e+00, 2e+01]
      Bounds range [1e+00, 1e+00]
306
                   [1e+00, 2e+10]
     RHS range
307
308 Warning: Model contains large matrix coefficients
309
     Warning: Model contains large rhs
310
          Consider reformulating model or setting NumericFocus parameter
311
          to avoid numerical issues.
312 Presolve removed 409079 rows and 213250 columns (presolve time = 5s) ...
313 Presolve removed 507827 rows and 222586 columns
314 Presolve time: 7.25s
315 Presolved: 40386 rows, 6839 columns, 104525 nonzeros
316 Variable types: 0 continuous, 6839 integer (6815 binary)
317 Root relaxation presolved: 6839 rows, 47225 columns, 111364 nonzeros
318
319
320 Root simplex log...
321
322 Iteration Objective
                           Primal Inf. Dual Inf.
                                                   Time
323
            handle free variables
324
       5248 6.1241111e+03 0.000000e+00 0.000000e+00
325
       5248 6.1241111e+03 0.000000e+00 0.000000e+00
326
327 Root relaxation: objective 6.124111e+03, 5248 iterations, 0.52 seconds (0.84 work units)
328
329
       Nodes | Current Node | Objective Bounds
                                                          Work
330 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
331
```

```
332
           0 6124.11111 0 11
                                    - 6124.11111
333
           0.6124.11111 \quad 0.124
                                    - 6124.11111
          0 6124.11111 0 135
                                    - 6124.11111
                                                       - 9s
334
       0
335 H 0 0
                       8124.11111111 6124.11111 24.6% -
       0 \quad 0.6124.11111 \quad 0 \quad 44.8124.11111.6124.11111.24.6\%
336
337
          0 6124.11111 0 15 8124.11111 6124.11111 24.6%
       0
                                                               - 11s
338 H 0 0
                        6584.1111111 6124.11111 6.99% - 11s
                                                              - 11s
339
       0 0 6124.11111 0 71 6584.11111 6124.11111 6.99%
340
           0.6124.11111 \quad 0.132.6584.11111.6124.11111.6.99\%
                                                               - 11s
                                                               - 11s
341
           0.6124.11111 0.129.6584.11111.6124.11111.6.99%
           0.6124.11111 \quad 0.127.6584.11111.6124.11111.6.99\%
342
                                                               - 12s
343
       0
           0 6124.11111 0 125 6584.11111 6124.11111 6.99%
                                                               - 12s
344
           0.6124.11111 \quad 0.137.6584.11111.6124.11111.6.99\%
                                                               - 12s
           0.6124.11111 \quad 0.131.6584.11111.6124.11111.6.99\%
345
       0
                                                               - 12s
346
       0
           0 6124.11111 0 81 6584.11111 6124.11111 6.99%
                                                               - 13s
           0.6124.11111 \quad 0.150.6584.11111.6124.11111.6.99\%
347
                                                               - 13s
348
           0 6124.11111 0 104 6584.11111 6124.11111 6.99%
       0
                                                               - 13s
           0.6124.11111 \quad 0.105.6584.11111.6124.11111.6.99\%
                                                               - 13s
349
       0
350
           0 6124.11111 0 140 6584.11111 6124.11111 6.99%
                                                               - 13s
351
       0
           0.6124.11111 \quad 0.138.6584.11111.6124.11111.6.99\%
                                                                - 13s
352
           0.6124.11111 0.113.6584.11111.6124.11111.6.99%
       0
                                                               - 14s
           0 6124.11111 0 89 6584.11111 6124.11111 6.99%
353
       0
                                                               - 14s
           0.6124.11111 \quad 0 \quad 49.6584.11111.6124.11111.6.99\%
354
       0
355 H 0 0
                       6124.1111111 6124.11111 0.00% - 16s
       0 0 6124.11111 0 49 6124.11111 6124.11111 0.00%
356
357
358 Cutting planes:
359
     Learned: 3
360
     Gomory: 2
      Cover: 139
361
362
     Implied bound: 19
363
     Clique: 132
364
     MIR: 25
      StrongCG: 16
365
366
     GUB cover: 9
367
      Zero half: 16
368
      RLT: 5
369
     Relax-and-lift: 1
370
     BOP: 7
371
372 Explored 1 nodes (41513 simplex iterations) in 16.34 seconds (22.64 work units)
373 Thread count was 8 (of 8 available processors)
374
375 Solution count 3: 6124.11 6584.11 8124.11
376
377 Optimal solution found (tolerance 1.00e-10)
378 Best objective 6.124111111111e+03, best bound 6.124111111111e+03, gap 0.0000%
379
    Set parameter MIPGap to value 1e-08
380 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
381
382
    CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
383 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
384
385 Optimize a model with 430077 rows, 12824 columns and 883303 nonzeros
386 Model fingerprint: 0x11cbd79b
387
    Variable types: 32 continuous, 12792 integer (7392 binary)
388 Coefficient statistics:
389
     Matrix range [1e-01, 1e+10]
390
     Objective range [6e-05, 5e+01]
     Bounds range [1e+00, 1e+00]
391
                    [8e-01, 1e+10]
392
     RHS range
393
    Warning: Model contains large matrix coefficients
394 Warning: Model contains large rhs
395
         Consider reformulating model or setting NumericFocus parameter
396
         to avoid numerical issues.
397 Presolve removed 425713 rows and 11330 columns
398 Presolve time: 0.31s
399 Presolved: 4364 rows, 1494 columns, 11603 nonzeros
400 Variable types: 6 continuous, 1488 integer (870 binary)
401 Found heuristic solution: objective 3698.4064055
402
403 Root relaxation: objective 5.325111e+03, 1274 iterations, 0.01 seconds (0.01 work units)
404
405
       Nodes | Current Node | Objective Bounds
406
     Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
407
408 H 0 0
                         5325.1111111 13319.7778 150% - 0s
409
       0 0
                 - 0
                         5325.11111 5325.11111 0.00% - 0s
410
411 Explored 1 nodes (1726 simplex iterations) in 0.44 seconds (0.64 work units)
412
    Thread count was 8 (of 8 available processors)
413
414 Solution count 2: 5325.11 3698.41
415
```

```
unknown
416 Optimal solution found (tolerance 1.00e-08)
417 Best objective 5.325111111111e+03, best bound 5.325111111111e+03, gap 0.0000%
418 SP is solved
419 SP's optimal solution is' ☐ 5325
420
421
      Itr = 2
422 Collect LB = [779.0, 5839.577136846152, 6124.11111111111]
423 Collect_UB = [10860.154273692304, 6124.111111111111, 6124.11111111111]
424 Collect Hua = [0.0, 5040.577136846152, 5325.111111111111]
425 Collect SPObjVal = [5040.577136846152, 5325.111111111111, 5325.11111111111]
426 Collect_MPObjValNHua = [779.0, 799.0, 799.0]
427
428
       Reach the termination conditions, stop iteration
429
430
      Values adopted from the Itr' th iteration, and Itr = \{2\}, judgeCount = \{2\}
431
432
                  -judge = 2, SPObj SPF = 5325.111111111111
433 Vessel i: 0:
                             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
                    pi: 0-6,
         bi: 18
     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
435
     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
     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
437
     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,
                   bi: 11
     betaNi: 11,
                   pi: 24-29,
     Vessel i: 5:
                                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
     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
                   pi: 22-28,
                                               gi SP-gpi SP: 0.800000-0.200000,
                                                                                                                           taoPi SP-deltaPi SP: 33-46,
     Vessel i: 7:
                                ai-di: 25-57,
                                                                                    ai SP-di: 33-57,
                                                                                                       taoi-deltai: 33-46,
     betaNi: 13,
                   bi: 13
441
442 round LB = [779, 5840, 6124]
443 round UB = [10860, 6124, 6124]
444 round Hua = [0, 5041, 5325]
445 round SPObjVal = [5041, 5325, 5325]
446 round MPObjValNHua = [779, 799, 799]
447
448 OptimalObj = 6124.111111111111
449 Time: 113.000000
450
451
452
453 libpng warning: iCCP: known incorrect sRGB profile
454 libpng warning: iCCP: known incorrect sRGB profile
455 libpng warning: iCCP: known incorrect sRGB profile
456 libpng warning: iCCP: known incorrect sRGB profile
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465 libpng warning: iCCP: known incorrect sRGB profile
466
```