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1 "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\setrou\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=
  client --port=40883
2
3 import sys; print('Python %s on %s' % (sys.version, sys.platform))
4 sys.path.extend(['E:\\1 \ \ \ \ \ \3 \ \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \ \1 \_LW_ \ \ \ \ \ \4 \ \ \ \ \ \3 python_code\\9 Code for this
  paper', 'E:/1 \ \ \ \ \ /3 \ \ \ \ \ /1 \ \ \ \ \ \ \ \ \ \ \ /1 \ \ \ \ \ \ \ \ \ \ \ /1 \_LW_ \ \ \ \ \ /4 \ \ \ \ \ /3 python_code/9 Code for this paper'])
5
6 PyDev console: starting.
7
8 Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
9 >>> runfile('E:/1 \ \ \ \ \ /3 \ \ \ \ \ /1 \ \ \ \ \ \ \ \ \ \ \ /1 \ \ \ \ \ \ \ \ \ \ \ /1 \_LW_ \ \ \ \ \ /4 \ \ \ \ \ /3 python_code/9 Code for this paper/
  main_RO_BDC.py', wdir='E:/1 \ \ \ \ \ /3 \ \ \ \ \ /1 \ \ \ \ \ \ \ \ \ \ \ /1 \ \ \ \ \ \ \ \ \ \ \ /1 \_LW_ \ \ \ \ \ /4 \ \ \ \ \ /3 python_code/9 Code for
  this paper')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
11 Waiting 5s.....
12 Set parameter MIPGap to value 1e-10
13 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
14
15 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
16 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
17
18 Optimize a model with 532644 rows, 52642 columns and 1496394 nonzeros
19 Model fingerprint: 0xc3512c76
20 Variable types: 1 continuous, 52641 integer (52605 binary)
21 Coefficient statistics:
22   Matrix range    [1e+00, 1e+10]
23   Objective range [1e+00, 2e+01]
24   Bounds range   [1e+00, 1e+00]
25   RHS range      [1e+00, 2e+10]
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.
30 Presolve removed 302841 rows and 23943 columns (presolve time = 5s) ...
31 Presolve removed 460984 rows and 34620 columns
32 Presolve time: 9.90s
33 Presolved: 71660 rows, 18022 columns, 271487 nonzeros
34 Variable types: 0 continuous, 18022 integer (17995 binary)
35
36 Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
37 Showing first log only...
38
39 Root relaxation presolved: 18022 rows, 89682 columns, 289509 nonzeros
40
41
42 Root simplex log...
43
44 Iteration   Objective    Primal Inf.   Dual Inf.    Time
45      0 8.9300000e+02 0.0000000e+00 1.1190000e+03 11s
46 Concurrent spin time: 0.00s
47
48 Solved with dual simplex (primal model)
49
50 Root relaxation: objective 8.930000e+02, 2440 iterations, 0.42 seconds (0.33 work units)
51
52   Nodes | Current Node | Objective Bounds | Work
53 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
54
55    0  0 893.00000  0 12      - 893.00000  -  - 11s
56 H  0  0          5293.0000000 893.00000 83.1%  - 12s
57 H  0  0          4973.0000000 893.00000 82.0%  - 12s
58 H  0  0          3853.0000000 893.00000 76.8%  - 12s
59   0  0 893.00000  0 168 3853.00000 893.00000 76.8%  - 13s
60 H  0  0          2133.0000000 893.00000 58.1%  - 13s
61 H  0  0          2013.0000000 893.00000 55.6%  - 13s
62   0  0 893.00000  0 167 2013.00000 893.00000 55.6%  - 13s
63   0  0 893.00000  0  54 2013.00000 893.00000 55.6%  - 15s
64   0  0 893.00000  0  64 2013.00000 893.00000 55.6%  - 16s
65 H  0  0          893.0000000 893.00000 0.00%  - 17s
66   0  0 893.00000  0  12 893.00000 893.00000 0.00%  - 17s
67
68 Cutting planes:
69 Cover: 37
70 Implied bound: 875
71 Clique: 8
72 MIR: 51
73 StrongCG: 47
74 GUB cover: 4
75 RLT: 7
76 Relax-and-lift: 472
77
78 Explored 1 nodes (17191 simplex iterations) in 17.69 seconds (22.99 work units)
79 Thread count was 8 (of 8 available processors)

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80
81 Solution count 6: 893 2013 2133 ... 5293
82
83 Optimal solution found (tolerance 1.00e-10)
84 Best objective 8.930000000000e+02, best bound 8.930000000000e+02, gap 0.0000%
85 Set parameter MIPGap to value 1e-08
86 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
87
88 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
89 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
90
91 Optimize a model with 2481703 rows, 1955335 columns and 17236216 nonzeros
92 Model fingerprint: 0x68d94f13
93 Variable types: 963295 continuous, 992040 integer (985965 binary)
94 Coefficient statistics:
95   Matrix range    [1e-01, 1e+10]
96   Objective range [6e-05, 5e+01]
97   Bounds range    [1e+00, 8e+01]
98   RHS range       [8e-01, 1e+10]
99 Warning: Model contains large matrix coefficients
100 Warning: Model contains large rhs
101   Consider reformulating model or setting NumericFocus parameter
102   to avoid numerical issues.
103 Presolve removed 2478029 rows and 1954013 columns (presolve time = 5s) ...
104 Presolve removed 2478029 rows and 1954013 columns
105 Presolve time: 5.48s
106 Presolved: 3674 rows, 1322 columns, 9781 nonzeros
107 Variable types: 8 continuous, 1314 integer (781 binary)
108 Found heuristic solution: objective 3324.0500186
109 Found heuristic solution: objective 3815.6702574
110
111 Root simplex log...
112
113 Iteration  Objective    Primal Inf.   Dual Inf.    Time
114      0   9.9372796e+03   3.480225e+03   0.000000e+00   7s
115    1135   5.2381303e+03   0.000000e+00   0.000000e+00   7s
116
117 Root relaxation: objective 5.238130e+03, 1135 iterations, 0.01 seconds (0.01 work units)
118
119   Nodes | Current Node | Objective Bounds | Work
120 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
121
122   0   0 5238.13028   0 47 3815.67026 5238.13028 37.3% - 7s
123 H  0   0           5222.7009882 5238.13028 0.30% - 7s
124  0   0 5237.20528   0 12 5222.70099 5237.20528 0.28% - 7s
125   0   0 5237.20528   0 12 5222.70099 5237.20528 0.28% - 7s
126 H  0   0           5235.3302838 5237.20528 0.04% - 7s
127 H  0   0           5236.7009882 5237.20528 0.01% - 7s
128   0   0 cutoff   0   5236.70099 5236.70099 0.00% - 7s
129
130 Cutting planes:
131   Learned: 10
132   Gomory: 1
133   Cover: 28
134   Implied bound: 33
135   Clique: 12
136   MIR: 6
137   Flow cover: 2
138   RLT: 6
139   Relax-and-lift: 20
140
141 Explored 1 nodes (1916 simplex iterations) in 7.44 seconds (7.31 work units)
142 Thread count was 8 (of 8 available processors)
143
144 Solution count 5: 5236.7 5235.33 5222.7 ... 3324.05
145
146 Optimal solution found (tolerance 1.00e-08)
147 Best objective 5.236700988201e+03, best bound 5.236700988201e+03, gap 0.0000%
148 SP is solved
149 SP's optimal solution is'□5236
150
151 Itr = 0
152 Collect_LB = [893.0]
153 Collect_UB = [11366.401976402522]
154 Collect_Hua = [0.0]
155 Collect_SPObjVal = [5236.700988201261]
156 Collect_MPObjValNHua = [893.0]
157
158
159 Set parameter TimeLimit to value 12000
160 Set parameter MIPGap to value 0.0005
161 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
162
163 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]

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164 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
165
166 Optimize a model with 541394 rows, 283978 columns and 1505198 nonzeros
167 Model fingerprint: 0xd1609124
168 Variable types: 1 continuous, 283977 integer (283941 binary)
169 Coefficient statistics:
170   Matrix range   [1e+00, 1e+10]
171   Objective range [1e+00, 2e+01]
172   Bounds range   [1e+00, 1e+00]
173   RHS range      [1e+00, 2e+10]
174 Warning: Model contains large matrix coefficients
175 Warning: Model contains large rhs
176   Consider reformulating model or setting NumericFocus parameter
177   to avoid numerical issues.
178 Presolve removed 377861 rows and 265257 columns (presolve time = 5s) ...
179 Presolve removed 377861 rows and 265257 columns (presolve time = 10s) ...
180 Presolve removed 490283 rows and 275538 columns
181 Presolve time: 10.92s
182 Presolved: 51111 rows, 8440 columns, 131258 nonzeros
183 Variable types: 0 continuous, 8440 integer (8414 binary)
184 Root relaxation presolved: 8440 rows, 59551 columns, 139698 nonzeros
185
186
187 Root simplex log...
188
189 Iteration   Objective    Primal Inf.   Dual Inf.    Time
190    0   handle free variables                11s
191   8144   6.1297010e+03  0.0000000e+00  0.0000000e+00   13s
192   8144   6.1297010e+03  0.0000000e+00  0.0000000e+00   13s
193
194 Root relaxation: objective 6.129701e+03, 8144 iterations, 1.79 seconds (2.48 work units)
195
196   Nodes | Current Node | Objective Bounds | Work
197 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
198
199   0   0 6129.70099   0 13      -6129.70099   - - 13s
200   0   0 6129.70099   0 400     -6129.70099   - - 16s
201   0   0 6129.70099   0 345     -6129.70099   - - 16s
202   0   0 6129.70099   0 249     -6129.70099   - - 16s
203   0   0 6129.70099   0 35      -6129.70099   - - 19s
204   0   0 6129.70099   0 282     -6129.70099   - - 20s
205   0   0 6129.70099   0 307     -6129.70099   - - 20s
206   0   0 6129.70099   0 214     -6129.70099   - - 21s
207   0   0 6129.70099   0 111     -6129.70099   - - 23s
208   0   0 6129.70099   0 110     -6129.70099   - - 23s
209   0   0 6129.70099   0 190     -6129.70099   - - 24s
210   0   0 6129.70099   0 120     -6129.70099   - - 24s
211   0   0 6129.70099   0 118     -6129.70099   - - 24s
212   0   0 6129.70099   0 25      -6129.70099   - - 25s
213   0   0 6129.70099   0 25      -6129.70099   - - 26s
214 H   0   0           6129.7009882 6129.70099 0.00%   - 27s
215   0   0 6129.70099   0 25 6129.70099 6129.70099 0.00%   - 27s
216
217 Cutting planes:
218   Learned: 1
219   Gomory: 2
220   Cover: 128
221   Implied bound: 22
222   Clique: 2538
223   MIR: 120
224   StrongCG: 80
225   GUB cover: 3
226   Zero half: 8
227   RLT: 7
228   Relax-and-lift: 17
229   BQP: 2
230
231 Explored 1 nodes (40936 simplex iterations) in 27.27 seconds (30.07 work units)
232 Thread count was 8 (of 8 available processors)
233
234 Solution count 1: 6129.7
235
236 Optimal solution found (tolerance 5.00e-04)
237 Best objective 6.129700988201e+03, best bound 6.129700988201e+03, gap 0.0000%
238 Set parameter MIPGap to value 1e-08
239 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
240
241 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
242 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
243
244 Optimize a model with 2481703 rows, 1955335 columns and 17236216 nonzeros
245 Model fingerprint: 0xb9a29d9f
246 Variable types: 963295 continuous, 992040 integer (985965 binary)
247 Coefficient statistics:

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248 Matrix range [1e-01, 1e+10]
249 Objective range [6e-05, 5e+01]
250 Bounds range [1e+00, 8e+01]
251 RHS range [8e-01, 1e+10]
252 Warning: Model contains large matrix coefficients
253 Warning: Model contains large rhs
254 Consider reformulating model or setting NumericFocus parameter
255 to avoid numerical issues.
256 Presolve removed 2476299 rows and 1953511 columns (presolve time = 5s) ...
257 Presolve removed 2476442 rows and 1953569 columns
258 Presolve time: 5.49s
259 Presolved: 5261 rows, 1766 columns, 14065 nonzeros
260 Variable types: 8 continuous, 1758 integer (1028 binary)
261 Found heuristic solution: objective 4330.7009882
262
263 Root simplex log...
264
265 Iteration Objective Primal Inf. Dual Inf. Time
266 0 1.0907280e+04 4.484819e+03 0.000000e+00 7s
267 1592 6.0447010e+03 0.000000e+00 0.000000e+00 7s
268
269 Root relaxation: objective 6.044701e+03, 1592 iterations, 0.02 seconds (0.02 work units)
270
271 Nodes | Current Node | Objective Bounds | Work
272 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
273
274 * 0 0 0 6044.7009882 6044.70099 0.00% - 7s
275
276 Explored 1 nodes (2084 simplex iterations) in 7.39 seconds (7.04 work units)
277 Thread count was 8 (of 8 available processors)
278
279 Solution count 2: 6044.7 4330.7
280
281 Optimal solution found (tolerance 1.00e-08)
282 Best objective 6.044700988201e+03, best bound 6.044700988201e+03, gap 0.0000%
283 SP is solved
284 SP's optimal solution is' 6044
285
286 Itr = 1
287 Collect_LB = [893.0, 6129.700988201261]
288 Collect_UB = [11366.401976402522, 6937.700988201261]
289 Collect_Hua = [0.0, 5236.700988201261]
290 Collect_SPObjVal = [5236.700988201261, 6044.700988201261]
291 Collect_MPObjValNHua = [893.0, 893.0]
292
293
294 Set parameter TimeLimit to value 12000
295 Set parameter MIPGap to value 0.0005
296 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
297
298 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
299 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
300
301 Optimize a model with 541395 rows, 283978 columns and 1505217 nonzeros
302 Model fingerprint: 0xd41571cb
303 Variable types: 1 continuous, 283977 integer (283941 binary)
304 Coefficient statistics:
305 Matrix range [1e+00, 1e+10]
306 Objective range [1e+00, 2e+01]
307 Bounds range [1e+00, 1e+00]
308 RHS range [1e+00, 2e+10]
309 Warning: Model contains large matrix coefficients
310 Warning: Model contains large rhs
311 Consider reformulating model or setting NumericFocus parameter
312 to avoid numerical issues.
313 Presolve removed 377862 rows and 265257 columns (presolve time = 5s) ...
314 Presolve removed 462913 rows and 275538 columns (presolve time = 10s) ...
315 Presolve removed 490284 rows and 275538 columns
316 Presolve time: 10.31s
317 Presolved: 51111 rows, 8440 columns, 131258 nonzeros
318 Variable types: 0 continuous, 8440 integer (8414 binary)
319 Root relaxation presolved: 8440 rows, 59551 columns, 139698 nonzeros
320
321
322 Root simplex log...
323
324 Iteration Objective Primal Inf. Dual Inf. Time
325 0 handle free variables 11s
326 8144 6.9377010e+03 0.000000e+00 0.000000e+00 12s
327 8144 6.9377010e+03 0.000000e+00 0.000000e+00 12s
328
329 Root relaxation: objective 6.937701e+03, 8144 iterations, 1.74 seconds (2.48 work units)
330
331 Nodes | Current Node | Objective Bounds | Work

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332 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
333
334 0 0 6937.70099 0 13 - 6937.70099 - - 12s
335 0 0 6937.70099 0 400 - 6937.70099 - - 15s
336 0 0 6937.70099 0 345 - 6937.70099 - - 15s
337 0 0 6937.70099 0 249 - 6937.70099 - - 16s
338 0 0 6937.70099 0 35 - 6937.70099 - - 18s
339 0 0 6937.70099 0 282 - 6937.70099 - - 19s
340 0 0 6937.70099 0 307 - 6937.70099 - - 20s
341 0 0 6937.70099 0 214 - 6937.70099 - - 20s
342 0 0 6937.70099 0 111 - 6937.70099 - - 22s
343 0 0 6937.70099 0 110 - 6937.70099 - - 22s
344 0 0 6937.70099 0 190 - 6937.70099 - - 23s
345 0 0 6937.70099 0 120 - 6937.70099 - - 23s
346 0 0 6937.70099 0 118 - 6937.70099 - - 23s
347 0 0 6937.70099 0 25 - 6937.70099 - - 25s
348 0 0 6937.70099 0 25 - 6937.70099 - - 25s
349 H 0 0 6937.7009882 6937.70099 0.00% - 26s
350 0 0 6937.70099 0 25 6937.70099 6937.70099 0.00% - 26s
351
352 Cutting planes:
353 Learned: 1
354 Gomory: 2
355 Cover: 128
356 Implied bound: 22
357 Clique: 2538
358 MIR: 120
359 StrongCG: 80
360 GUB cover: 3
361 Zero half: 8
362 RLT: 7
363 Relax-and-lift: 17
364 BQP: 2
365
366 Explored 1 nodes (40936 simplex iterations) in 26.47 seconds (30.07 work units)
367 Thread count was 8 (of 8 available processors)
368
369 Solution count 1: 6937.7
370
371 Optimal solution found (tolerance 5.00e-04)
372 Best objective 6.937700988201e+03, best bound 6.937700988201e+03, gap 0.0000%
373 Set parameter MIPGap to value 1e-08
374 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
375
376 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
377 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
378
379 Optimize a model with 2481703 rows, 1955335 columns and 17236216 nonzeros
380 Model fingerprint: 0xb9a29d9f
381 Variable types: 963295 continuous, 992040 integer (985965 binary)
382 Coefficient statistics:
383 Matrix range [1e-01, 1e+10]
384 Objective range [6e-05, 5e+01]
385 Bounds range [1e+00, 8e+01]
386 RHS range [8e-01, 1e+10]
387 Warning: Model contains large matrix coefficients
388 Warning: Model contains large rhs
389 Consider reformulating model or setting NumericFocus parameter
390 to avoid numerical issues.
391 Presolve removed 2476304 rows and 1953511 columns (presolve time = 5s) ...
392 Presolve removed 2476442 rows and 1953569 columns
393 Presolve time: 5.37s
394 Presolved: 5261 rows, 1766 columns, 14065 nonzeros
395 Variable types: 8 continuous, 1758 integer (1028 binary)
396 Found heuristic solution: objective 4330.7009882
397
398 Root simplex log...
399
400 Iteration Objective Primal Inf. Dual Inf. Time
401 0 1.0907280e+04 4.484819e+03 0.000000e+00 7s
402 1592 6.0447010e+03 0.000000e+00 0.000000e+00 7s
403
404 Root relaxation: objective 6.044701e+03, 1592 iterations, 0.03 seconds (0.02 work units)
405
406 Nodes | Current Node | Objective Bounds | Work
407 Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
408
409 * 0 0 0 6044.7009882 6044.70099 0.00% - 6s
410
411 Explored 1 nodes (2084 simplex iterations) in 7.21 seconds (7.04 work units)
412 Thread count was 8 (of 8 available processors)
413
414 Solution count 2: 6044.7 4330.7
415

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416 Optimal solution found (tolerance 1.00e-08)
417 Best objective 6.044700988201e+03, best bound 6.044700988201e+03, gap 0.0000%
418 SP is solved
419 SP's optimal solution is'□6044
420
421 Itr = 2
422 Collect_LB = [893.0, 6129.700988201261, 6937.700988201261]
423 Collect_UB = [11366.401976402522, 6937.700988201261, 6937.700988201261]
424 Collect_Hua = [0.0, 5236.700988201261, 6044.700988201261]
425 Collect_SPObjVal = [5236.700988201261, 6044.700988201261, 6044.700988201261]
426 Collect_MPObjValNHua = [893.0, 893.0, 893.0]
427
428
429 Reach the termination conditions, stop iteration
430 Values adopted from the Itr' th iteration, and Itr = {2}, judgeCount = {2}
431
432 ~~~~~judge = 2, SPObj_SPF = 6044.700988201261
433 Vessel i: 0: pi: 0-5, ai-di: 54-79, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 54-79, taoi-deltai: 54-68, taoPi_SP-deltaPi_SP: 54-68, betaNi:
14, bi: 14
434 Vessel i: 1: pi: 0-6, ai-di: 11-34, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 11-34, taoi-deltai: 11-31, taoPi_SP-deltaPi_SP: 11-31, betaNi:
20, bi: 20
435 Vessel i: 2: pi: 6-11, ai-di: 13-21, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 13-21, taoi-deltai: 13-19, taoPi_SP-deltaPi_SP: 13-19, betaNi:
6, bi: 6
436 Vessel i: 3: pi: 5-12, ai-di: 47-82, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 47-82, taoi-deltai: 47-71, taoPi_SP-deltaPi_SP: 47-71, betaNi:
24, bi: 24
437 Vessel i: 4: pi: 6-11, ai-di: 33-46, gi_SP-gpi_SP: 0.000000-0.000000, ai_SP-di: 33-46, taoi-deltai: 33-38, taoPi_SP-deltaPi_SP: 33-38, betaNi:
5, bi: 5
438 Vessel i: 5: pi: 3-8, ai-di: 40-55, gi_SP-gpi_SP: 0.000000-1.000000, ai_SP-di: 40-55, taoi-deltai: 40-45, taoPi_SP-deltaPi_SP: 40-45, betaNi:
5, bi: 5
439 Vessel i: 6: pi: 14-20, ai-di: 9-31, gi_SP-gpi_SP: 0.500000-0.100000, ai_SP-di: 13-31, taoi-deltai: 13-27, taoPi_SP-deltaPi_SP: 13-27, betaNi:
14, bi: 14
440 Vessel i: 7: pi: 27-34, ai-di: 13-47, gi_SP-gpi_SP: 0.900000-0.700000, ai_SP-di: 22-47, taoi-deltai: 22-47, taoPi_SP-deltaPi_SP: 22-47,
betaNi: 25, bi: 25
441 Vessel i: 8: pi: 15-22, ai-di: 36-72, gi_SP-gpi_SP: 1.000000-0.600000, ai_SP-di: 43-72, taoi-deltai: 43-71, taoPi_SP-deltaPi_SP: 43-71,
betaNi: 28, bi: 28
442
443 round LB = [893, 6130, 6938]
444 round UB = [11366, 6938, 6938]
445 round Hua = [0, 5237, 6045]
446 round SPObjVal = [5237, 6045, 6045]
447 round MPObjValNHua = [893, 893, 893]
448
449 OptimalObj = 6937.700988201261
450 Time: 610.000000
451
452
453
454

```