```
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=51079
 3
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
     sys.path.extend(|'E:\\1 000\\3 0000\\1 00000\\1 000000\\1 00000\\1 LW 0000\\4 0000\\3 python code\\9 Code for this
     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 00000/1 00000/1 00000/1 LW_000/4 000/3 python_code/9 Code for this paper/main_RO_BDC.py', wdir='E:/1 0000/3 0000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 000000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00000/1 00
     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 546361 rows, 52642 columns and 1529305 nonzeros
19
     Model fingerprint: 0x080f55c9
20
     Variable types: 1 continuous, 52641 integer (52605 binary)
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.
30
     Presolve removed 323914 rows and 24616 columns (presolve time = 5s) ...
31
     Presolve removed 462566 rows and 35488 columns
     Presolve time: 9.58s
     Presolved: 83795 rows, 17154 columns, 258615 nonzeros
34
      Variable types: 0 continuous, 17154 integer (17127 binary)
35
     Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
     Showing first log only...
37
38
39
     Root relaxation presolved: 17154 rows, 100949 columns, 275769 nonzeros
40
41
42
     Root simplex log...
43
44
     Iteration Objective
                                      Primal Inf. Dual Inf.
           0 7.8000000e+02 0.000000e+00 1.001000e+03
45
                                                                                    10s
46
     Concurrent spin time: 0.01s
48
     Solved with dual simplex (primal model)
49
50
     Root relaxation: objective 7.800000e+02, 2393 iterations, 0.47 seconds (0.38 work units)
51
52
         Nodes | Current Node | Objective Bounds
                                                                              Work
53
      Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
54
55
               0.780.00000 0.14
                                                    - 780.00000
                                                   - 780.00000 - - 11s
56
         0 0 780.00000 0 38
                                   1740.0000000 780.00000 55.2% - 11s
57
     H \quad 0 \quad 0
          0  0  780.00000  0  6  1740.00000  780.00000  55.2%  - 13s
59
               0 780.00000 0 36 1740.00000 780.00000 55.2%
         0
               0 780,00000 0 33 1740,00000 780,00000 55,2%
60
         0
               0 780.00000 0 51 1740.00000 780.00000 55.2%
          0
               0 780.00000 0 88 1740.00000 780.00000 55.2%
                                                                                         - 15s
62
              0 780.00000 0 86 1740.00000 780.00000 55.2% - 15s
63
         0
64 H 0 0
                                    780.0000000 780.00000 0.00%
              0 780.00000 0 2 780.00000 780.00000 0.00% - 16s
65
66
67
     Cutting planes:
68
69
       Implied bound: 1178
70
       Clique: 21
       MIR: 117
       StrongCG: 84
73
       GUB cover: 6
74
       Zero half: 7
       Mod-K: 15
76
       RLT: 18
       Relax-and-lift: 16
77
78
       BQP: 3
79
```

```
80 Explored 1 nodes (24632 simplex iterations) in 16.69 seconds (27.90 work units)
 81 Thread count was 8 (of 8 available processors)
 83 Solution count 2: 780 1740
 85 Optimal solution found (tolerance 1.00e-10)
 86 Best objective 7.800000000000e+02, best bound 7.80000000000e+02, gap 0.0000%
 87 Set parameter MIPGap to value 1e-08
 88 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
 89
 90 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
 91
    Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
 93 Optimize a model with 2481733 rows, 1955335 columns and 17236336 nonzeros
 94
    Model fingerprint: 0x37c8cb7f
    Variable types: 963295 continuous, 992040 integer (985965 binary)
 96 Coefficient statistics:
      Matrix range [1e-01, 1e+10]
 97
 98
     Objective range [6e-05, 5e+01]
      Bounds range [1e+00, 8e+01]
                   [8e-01, 1e+10]
100
     RHS range
    Warning: Model contains large matrix coefficients
101
    Warning: Model contains large rhs
102
103
          Consider reformulating model or setting NumericFocus parameter
104
          to avoid numerical issues.
105 Presolve removed 2478607 rows and 1954205 columns (presolve time = 5s) ...
106 Presolve removed 2478702 rows and 1954207 columns
107 Presolve time: 5.87s
108 Presolved: 3031 rows, 1128 columns, 8112 nonzeros
109 Variable types: 6 continuous, 1122 integer (664 binary)
110 Found heuristic solution: objective 3035.0500186
111 Found heuristic solution: objective 3411.0500186
112
113 Root simplex log...
114
115 Iteration Objective
                          Primal Inf. Dual Inf.
116
         0 8.9062796e+03 4.419845e+03 0.000000e+00
       900 4.8910500e+03 0.000000e+00 0.000000e+00
117
118
Root relaxation: objective 4.891050e+03, 900 iterations, 0.01 seconds (0.01 work units)
120
121
       Nodes | Current Node | Objective Bounds
                                                          Work
     Expl\ Unexpl\ |\ \ Obj\ \ Depth\ IntInf\ |\ Incumbent \qquad BestBd \quad Gap\ |\ It/Node\ Time
122
123
       0 0 4891.05002 0 24 3411.05002 4891.05002 43.4%
124
125 H 0 0
                      4825.0500186 4891.05002 1.37% - 7s
                     0 4891.0500186 4891.05002 0.00% - 7s
126 *
       0 0
127
128 Cutting planes:
129
     Learned: 1
130
     Gomory: 3
131
      Cover: 2
     Implied bound: 7
132
133
      Clique: 3
134
      MIR: 4
135
      Flow cover: 7
136
      Zero half: 1
137
      RLT: 2
138
      Relax-and-lift: 1
139
140 Explored 1 nodes (1364 simplex iterations) in 7.77 seconds (7.30 work units)
141 Thread count was 8 (of 8 available processors)
142
143 Solution count 4: 4891.05 4825.05 3411.05 3035.05
144
145 Optimal solution found (tolerance 1.00e-08)
146 Best objective 4.891050018628e+03, best bound 4.891050018628e+03, gap 0.0000%
147 SP is solved
148 SP's optimal solution is' □4891
149
150 Itr = 0
151 Collect_LB = [780.0]
152 Collect_UB = [10562.10003725563]
153 Collect Hua = [0.0]
154 Collect SPObjVal = [4891.050018627815]
155 Collect MPObjValNHua = [780.0]
156
157
158 Set parameter TimeLimit to value 12000
159 Set parameter MIPGap to value 0.0005
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 554091 rows, 283978 columns and 1537089 nonzeros
166 Model fingerprint: 0xc38fefd5
167
    Variable types: 1 continuous, 283977 integer (283941 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 395544 rows and 265240 columns (presolve time = 5s) ...
178 Presolve removed 502211 rows and 275364 columns (presolve time = 10s) ...
179 Presolve removed 502229 rows and 275364 columns
180 Presolve time: 10.20s
181 Presolved: 51862 rows, 8614 columns, 134659 nonzeros
182 Variable types: 0 continuous, 8614 integer (8587 binary)
183 Root relaxation presolved: 8614 rows, 60476 columns, 143273 nonzeros
184
185
186 Root simplex log...
187
188 Iteration Objective
                         Primal Inf. Dual Inf.
                                              Time
189
           handle free variables
                                          11s
      6798 \quad 5.6710500e + 03 \quad 0.000000e + 00 \quad 0.000000e + 00
190
191
      6798 5.6710500e+03 0.000000e+00 0.000000e+00
192
193 Root relaxation: objective 5.671050e+03, 6798 iterations, 1.09 seconds (1.80 work units)
194
195
      Nodes | Current Node | Objective Bounds
                                                    Work
196
     Expl\ Unexpl\ |\ \ Obj\ \ Depth\ IntInf\ |\ Incumbent \\ \ \ \ BestBd\ \ \ Gap\ |\ It/Node\ Time
197
198
          0 5671.05002 0 57
                                 - 5671.05002
                                  - 5671.05002
          0 5671.05002 0 204
199
200
       0
          0 5671.05002
                       0 262
                                  - 5671.05002
                                                   - 15s
201
          0 5671.05002 0 190
                                  - 5671.05002
                                                   - 15s
          0 5671.05002 0 175
                                 - 5671.05002
202
       0
                                                   - 15s
                                 - 5671.05002
203
       0
          0 5671.05002 0 29
                                               - - 17s
204
          0 5671.05002
                       0 33
                                 - 5671.05002
205
       0
          0 5671.05002 0 26
                                 - 5671.05002
                                                  - 18s
                                                 - 18s
          0 5671.05002 0 89
206
       0
                                 - 5671 05002
207
       0
          0 5671.05002 0 89
                                 - 5671.05002
                                               - - 18s
       0
          0\ 5671.05002\quad 0\quad 35
208
                                 - 5671.05002
          0 5671.05002 0 93
209
       0
                                 - 5671.05002
                                 - 5671.05002
          0 5671.05002 0 201
210
       0
                                                   - 20s
211
       0
          0 5671.05002
                       0 196
                                  - 5671.05002
                                                     20s
                                                 - 22s
212
          0 5671.05002 0 1
                                 - 5671.05002
       0
                      6031.0500186 5671.05002 5.97% - 22s
213 H 0
          0
214 H
       0
          0
                      5931.0500186 5671.05002 4.38%
215
          216
       0
                                                         - 22s
          217
       0
                                                            228
218
          - 25s
219
          0
                                                            2.5s
          220
       0
221 H 0 0
                      5671.0500186 5671.05002 0.00% - 26s
222
       0 \quad 0.5671.05002 \quad 0 \quad 22.5671.05002.5671.05002.0.00\%
223
224 Cutting planes:
225
     Learned: 2
226
     Gomory: 6
227
     Cover: 256
228
     Implied bound: 1717
229
     Clique: 2678
230
     MIR: 38
     StrongCG: 18
231
232
     GUB cover: 16
     Zero half: 2
233
234
     RLT: 19
235
     Relax-and-lift: 68
236
     BQP: 6
237
238 Explored 1 nodes (63444 simplex iterations) in 26.05 seconds (36.30 work units)
239 Thread count was 8 (of 8 available processors)
240
241 Solution count 3: 5671.05 5931.05 6031.05
242
243 Optimal solution found (tolerance 5.00e-04)
244 Best objective 5.671050018628e+03, best bound 5.671050018628e+03, gap 0.0000%
245 Set parameter MIPGap to value 1e-08
246 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
247
```

```
248 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
249 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
250
251 Optimize a model with 2481733 rows, 1955335 columns and 17236336 nonzeros
252 Model fingerprint: 0x3d954fb3
253 Variable types: 963295 continuous, 992040 integer (985965 binary)
254 Coefficient statistics:
255 Matrix range [1e-01, 1e+10]
     Objective range [6e-05, 5e+01]
256
     Bounds range [1e+00, 8e+01]
257
258
                    [8e-01, 1e+10]
     RHS range
259 Warning: Model contains large matrix coefficients
260 Warning: Model contains large rhs
          Consider reformulating model or setting NumericFocus parameter
261
262
          to avoid numerical issues.
263 Presolve removed 2477006 rows and 1953719 columns (presolve time = 5s) ...
264 Presolve removed 2477012 rows and 1953719 columns
265 Presolve time: 5.55s
266 Presolved: 4721 rows, 1616 columns, 12482 nonzeros
267
    Variable types: 8 continuous, 1608 integer (932 binary)
268 Found heuristic solution: objective 3527.0500186
269
270 Root simplex log...
271
272 Iteration Objective
                          Primal Inf. Dual Inf.
                                                   Time
        0 1.0997452e+04 5.446083e+03 0.000000e+00
273
274
       1508 5.3506703e+03 0.000000e+00 0.000000e+00
275
276 Root relaxation: objective 5.350670e+03, 1508 iterations, 0.01 seconds (0.02 work units)
277
278
       Nodes | Current Node | Objective Bounds
                                                          Work
279
     Expl\ Unexpl\ |\ \ Obj\ \ Depth\ IntInf\ |\ Incumbent \qquad BestBd \quad Gap\ |\ It/Node\ Time
280
       0 0 5350.67026 0 7 3527.05002 5350.67026 51.7%
281
282 H 0 0
                        5330.6702574 5350.67026 0.38% - 7s
                     0 5350.6702574 5350.67026 0.00% - 7s
283 *
       0 0
284
285 Cutting planes:
      Gomory: 2
286
287
      Implied bound: 1
288
      Zero half: 4
289
      RLT: 1
290
291 Explored 1 nodes (2103 simplex iterations) in 7.46 seconds (7.05 work units)
292 Thread count was 8 (of 8 available processors)
293
294 Solution count 3: 5350.67 5330.67 3527.05
295
296 Optimal solution found (tolerance 1.00e-08)
297 Best objective 5.350670257367e+03, best bound 5.350670257367e+03, gap 0.0000%
298 SP is solved
299 SP's optimal solution is' ☐ 5350
300
301 Itr = 1
302 Collect_LB = [780.0, 5671.050018627815]
303 Collect UB = [10562.10003725563, 6130.670257367259]
304 Collect Hua = [0.0, 4891.050018627815]
305 Collect_SPObjVal = [4891.050018627815, 5350.670257367259]
306 Collect_MPObjValNHua = [780.0, 780.0]
307
308
309 Set parameter TimeLimit to value 12000
310 Set parameter MIPGap to value 0.0005
311 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
312
313 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
314 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
315
316 Optimize a model with 554092 rows, 283978 columns and 1537108 nonzeros
317 Model fingerprint: 0xc3c5a57b
318 Variable types: 1 continuous, 283977 integer (283941 binary)
319 Coefficient statistics:
320
      Matrix range [1e+00, 1e+10]
      Objective range [1e+00, 2e+01]
321
     Bounds range [1e+00, 1e+00]
322
323
      RHS range
                   [1e+00, 2e+10]
324 Warning: Model contains large matrix coefficients
325 Warning: Model contains large rhs
          Consider reformulating model or setting NumericFocus parameter
326
327
          to avoid numerical issues.
328 Presolve removed 397441 rows and 265495 columns (presolve time = 5s) ...
329 Presolve removed 502687 rows and 275434 columns
330 Presolve time: 9.79s
331 Presolved: 51405 rows, 8544 columns, 132856 nonzeros
```

```
Variable types: 0 continuous, 8544 integer (8517 binary)
333 Root relaxation presolved: 8544 rows, 59949 columns, 141400 nonzeros
334
335
336 Root simplex log...
337
338 Iteration Objective
                           Primal Inf. Dual Inf.
                                                   Time
339
            handle free variables
                                              10s
       6478 \quad 6.1306703e + 03 \quad 0.000000e + 00 \quad 0.000000e + 00
340
                                                            11s
341
       6478 6.1306703e+03 0.000000e+00 0.000000e+00
                                                            11s
342
Root relaxation: objective 6.130670e+03, 6478 iterations, 0.87 seconds (1.50 work units)
344
                                                       | Work
345
       Nodes | Current Node | Objective Bounds
346
     Expl\ Unexpl\ |\ \ Obj\ \ Depth\ IntInf\ |\ Incumbent \qquad BestBd\quad Gap\ |\ It/Node\ Time
347
           0 6130.67026 0 8
                                    - 6130.67026
348
                                                   - - 11s
349
           0.6130.67026 0.38
                                     - 6130.67026
                                                   - - 12s
       0
350
           0 6130.67026 0 38
                                    - 6130.67026
                                                       - 12s
351
       0
           0.6130.67026 \quad 0 \quad 36
                                     - 6130.67026
                                                        - 13s
352
           0.6130.67026 0 36
       0
                                    - 6130.67026
                                                       - 13s
353
       0
           0 6130.67026 0 139
                                     - 6130.67026
                                                        - 13s
354
       0
           0 6130.67026 0 155
                                     - 6130.67026
355
       0
           0 6130.67026 0 9
                                    - 6130.67026
                                                   - - 15s
           0 6130.67026 0 9
356
                                    - 6130.67026
                                                   - - 15s
       0
                                                   - - 15s
357
       0
           0 6130.67026 0 9
                                    - 6130.67026
                        6130.6702574 6130.67026 0.00% - 16s
358 H 0 0
           0 6130.67026 0 9 6130.67026 6130.67026 0.00% - 16s
359
360
361 Cutting planes:
362
     Cover: 135
     Implied bound: 25
363
364
     Clique: 855
      MIR: 134
365
366
     StrongCG: 128
      GUB cover: 16
367
368
      Zero half: 2
369
     RLT: 4
370
     Relax-and-lift: 30
371
      BQP: 1
373 Explored 1 nodes (23210 simplex iterations) in 16.29 seconds (22.45 work units)
374 Thread count was 8 (of 8 available processors)
375
376 Solution count 1: 6130.67
377
378 Optimal solution found (tolerance 5.00e-04)
    Best objective 6.130670257367e+03, best bound 6.130670257367e+03, gap 0.0000%
380 Set parameter MIPGap to value 1e-08
381 Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
382
383 CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
384 Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
385
386 Optimize a model with 2481733 rows, 1955335 columns and 17236336 nonzeros
387 Model fingerprint: 0xbcfc9c56
388 Variable types: 963295 continuous, 992040 integer (985965 binary)
389 Coefficient statistics:
390
     Matrix range [1e-01, 1e+10]
391
     Objective range [6e-05, 5e+01]
     Bounds range [1e+00, 8e+01]
392
393
     RHS range
                    [8e-01, 1e+10]
    Warning: Model contains large matrix coefficients
395 Warning: Model contains large rhs
396
          Consider reformulating model or setting NumericFocus parameter
397
          to avoid numerical issues.
398 Presolve removed 2477744 rows and 1953883 columns (presolve time = 5s) ...
399 Presolve removed 2477955 rows and 1953963 columns
400 Presolve time: 5.63s
    Presolved: 3778 rows, 1372 columns, 10105 nonzeros
402 Variable types: 8 continuous, 1364 integer (805 binary)
403 Found heuristic solution: objective 3586.6702574
404
405 Root simplex log...
406
407 Iteration Objective
                           Primal Inf. Dual Inf.
408
           1.0793581e+04 5.063747e+03 0.000000e+00
409
       1045 5.3894515e+03 0.000000e+00 0.000000e+00
410
411 Root relaxation: objective 5.389451e+03, 1045 iterations, 0.01 seconds (0.01 work units)
412
413
       Nodes | Current Node | Objective Bounds
                                                          Work
     Expl Unexpl | Obj Depth IntInf | Incumbent BestBd Gap | It/Node Time
414
415
```

```
416
        0
            0
                      0 5389.4514539 5389.45145 0.00% - 7s
417
418 Explored 1 nodes (1413 simplex iterations) in 7.45 seconds (7.01 work units)
419 Thread count was 8 (of 8 available processors)
420
421 Solution count 2: 5389.45 3586.67
422
423 Optimal solution found (tolerance 1.00e-08)
424 Best objective 5.389451453897e+03, best bound 5.389451453897e+03, gap 0.0000%
425 SP is solved
426 SP's optimal solution is' ☐ 5389
427
428 	ext{ Itr} = 2
429 Collect LB = [780.0, 5671.050018627815, 6130.670257367259]
430 Collect_UB = [10562.10003725563, 6130.670257367259, 6130.670257367259]
431 Collect Hua = [0.0, 4891.050018627815, 5350.670257367259]
432 Collect SPObjVal = [4891.050018627815, 5350.670257367259, 5389.451453896585]
433 Collect_MPObjValNHua = [780.0, 780.0, 780.0]
434
435
436
      Reach the termination conditions, stop iteration
437
     Values adopted from the Itr' th iteration, and Itr = \{2\}, judgeCount = \{2\}
438
                 -judge = 2, SPObj SPF = 5389.451453896585
439
440 Vessel i: 0:
                   pi: 1-6, ai-di: 13-26, gi_SP-gpi_SP: 0.000000-0.000000,
                                                                                                                       taoPi_SP-deltaPi_SP: 13-22,
                                                                                 ai SP-di: 13-26,
                                                                                                   taoi-deltai: 13-22,
                                                                                                                                                      betaNi:
         bi: 9
                              ai-di: 7-21,
                                            gi_SP-gpi_SP: 0.000000-0.000000,
                                                                                                                     taoPi_SP-deltaPi_SP: 7-17, betaNi: 10
     Vessel i: 1:
                   pi: 6-12,
                                                                                 ai_SP-di: 7-21,
                                                                                                  taoi-deltai: 7-17,
         bi: 10
                                                                                                                         taoPi_SP-deltaPi_SP: 19-30,
     Vessel i: 2:
                   pi: 6-11,
                              ai-di: 19-34,
                                            gi_SP-gpi_SP: 0.000000-0.000000,
                                                                                  ai_SP-di: 19-34,
                                                                                                     taoi-deltai: 19-30,
                                                                                                                                                       betaNi
     : 11, bi: 11
                  pi: 3-9,
     Vessel i: 3:
                            ai-di: 31-42,
                                            gi SP-gpi SP: 0.000000-0.000000,
                                                                                 ai SP-di: 31-42,
                                                                                                   taoi-deltai: 31-38,
                                                                                                                        taoPi SP-deltaPi SP: 31-38,
                                                                                                                                                      betaNi:
         bi: 7
     Vessel i: 4:
                   pi: 4-11,
                              ai-di: 39-78,
                                             gi_SP-gpi_SP: 0.000000-0.000000,
                                                                                  ai_SP-di: 39-78,
                                                                                                     taoi-deltai: 39-73,
                                                                                                                         taoPi_SP-deltaPi_SP: 39-73,
                                                                                                                                                       betaNi
           bi: 34
     : 34,
     Vessel i: 5:
                   pi: 14-20,
                               ai-di: 14-42,
                                              gi_SP-gpi_SP: 0.000000-0.600000,
                                                                                   ai_SP-di: 14-42,
                                                                                                      taoi-deltai: 14-24,
                                                                                                                          taoPi_SP-deltaPi_SP: 14-24,
     betaNi: 10,
                   bi: 10
     Vessel i: 6:
                   pi: 27-34,
                               ai-di: 17-74,
                                              gi_SP-gpi_SP: 1.000000-0.000000,
                                                                                   ai_SP-di: 25-74,
                                                                                                      taoi-deltai: 25-55,
                                                                                                                          taoPi_SP-deltaPi_SP: 25-55,
                   bi: 30
     betaNi: 30,
     Vessel i: 7:
                   pi: 18-23,
                                              gi_SP-gpi_SP: 0.800000-0.800000,
                                                                                                      taoi-deltai: 39-46,
                                                                                                                          taoPi_SP-deltaPi_SP: 43-46,
                               ai-di: 35-62,
                                                                                   ai_SP-di: 43-62,
     betaNi: 7,
                  bi: 7
     Vessel i: 8:
                  pi: 29-34,
                               ai-di: 51-79,
                                              gi_SP-gpi_SP: 0.600000-1.000000,
                                                                                   ai_SP-di: 55-79,
                                                                                                      taoi-deltai: 58-65,
                                                                                                                          taoPi_SP-deltaPi_SP: 58-65,
                 bi: 7
     betaNi: 7,
449
450 round LB = [780, 5671, 6131]
451 round UB = [10562, 6131, 6131]
452 round Hua = [0, 4891, 5351]
453 round SPObjVal = [4891, 5351, 5389]
454
    round MPObjValNHua = [780, 780, 780]
455
456 OptimalObj = 6130.670257367259
457
    Time: 549.000000
458
459
460
461
```