```
 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\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=
    client --port=41292
 2
 3  import sys; print('Python %s on %s' % (sys.version, sys.platform))
 4  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'])
 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_□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper/
    main_DM.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□/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  Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)
13
14  CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
15  Thread count: 4 physical cores, 8 logical processors, using up to 8 threads
16
17  Optimize a model with 667090 rows, 47910 columns and 1947619 nonzeros
18  Model fingerprint: 0x109e7b47
19  Variable types: 0 continuous, 47910 integer (40308 binary)
20  Coefficient statistics:
21    Matrix range     [1e-01, 1e+15]
22    Objective range  [1e+00, 5e+01]
23    Bounds range     [1e+00, 1e+00]
24    RHS range        [1e+00, 2e+15]
25  Warning: Model contains large matrix coefficient range
26  Warning: Model contains large rhs
27        Consider reformulating model or setting NumericFocus parameter
28        to avoid numerical issues.
29  Presolve removed 390038 rows and 21184 columns (presolve time = 5s) ...
30  Presolve removed 396129 rows and 21415 columns (presolve time = 11s) ...
31  Presolve removed 404948 rows and 22135 columns (presolve time = 15s) ...
32  Presolve removed 404948 rows and 22135 columns (presolve time = 20s) ...
33  Presolve removed 404948 rows and 22135 columns (presolve time = 25s) ...
34  Presolve removed 404948 rows and 22135 columns (presolve time = 30s) ...
35  Presolve removed 404948 rows and 22135 columns (presolve time = 35s) ...
36  Presolve removed 563618 rows and 32408 columns
37  Presolve time: 39.45s
38  Presolved: 103472 rows, 15502 columns, 384114 nonzeros
39  Variable types: 0 continuous, 15502 integer (15188 binary)
40
41  Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
42  Showing first log only...
43
44  Root relaxation presolved: 15496 rows, 118956 columns, 398843 nonzeros
45
46
47  Root simplex log...
48
49  Iteration    Objective       Primal Inf.    Dual Inf.      Time
50       0   -1.0282000e+04   0.000000e+00   2.399035e+05     41s
51  Concurrent spin time: 0.08s
52
53  Solved with dual simplex (primal model)
54
55  Root relaxation: objective 5.030328e+02, 3367 iterations, 1.56 seconds (1.63 work units)
56
57      Nodes    |    Current Node    |     Objective Bounds      |     Work
58   Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time
59
60       0     0  503.03283    0  768          -  503.03283      -     -   43s
61       0     0  515.78540    0  869          -  515.78540      -     -   51s
62       0     0  515.78540    0  816          -  515.78540      -     -   51s
63       0     0  525.32074    0 1061          -  525.32074      -     -   54s
64       0     0  525.32074    0 1054          -  525.32074      -     -   54s
65       0     0  525.91880    0 1380          -  525.91880      -     -   54s
66       0     0  526.97998    0 1524          -  526.97998      -     -   55s
67       0     0  527.76285    0 1532          -  527.76285      -     -   56s
68       0     0  528.27359    0 1162          -  528.27359      -     -   57s
69       0     0  528.56013    0 1332          -  528.56013      -     -   58s
70       0     0  528.88178    0 1242          -  528.88178      -     -   59s
71       0     0  529.09061    0  976          -  529.09061      -     -   60s
72       0     0  529.50391    0  990          -  529.50391      -     -   61s
73       0     0  529.77504    0  991          -  529.77504      -     -   61s
74       0     0  530.04537    0 1345          -  530.04537      -     -   62s
75       0     0  530.32699    0 1336          -  530.32699      -     -   63s
76       0     0  530.72987    0 1339          -  530.72987      -     -   63s
77       0     0  530.78885    0 1331          -  530.78885      -     -   63s
78       0     0  531.09669    0 1360          -  531.09669      -     -   64s
79       0     0  531.40608    0 1380          -  531.40608      -     -   65s
```

80	0	0	531.52969	0 1632	-	531.52969	-	-	65s
81	0	0	531.62324	0 1635	-	531.62324	-	-	66s
82	0	0	532.07399	0 1870	-	532.07399	-	-	66s
83	0	0	532.52170	0 1855	-	532.52170	-	-	67s
84	0	0	532.61789	0 2248	-	532.61789	-	-	67s
85	0	0	532.90525	0 2363	-	532.90525	-	-	68s
86	0	0	533.14871	0 2309	-	533.14871	-	-	68s
87	0	0	533.36000	0 1969	-	533.36000	-	-	69s
88	0	0	533.45217	0 1969	-	533.45217	-	-	69s
89	0	0	533.76550	0 1955	-	533.76550	-	-	70s
90	0	0	533.97386	0 1964	-	533.97386	-	-	70s
91	0	0	534.05696	0 1968	-	534.05696	-	-	70s
92	0	0	534.24689	0 1990	-	534.24689	-	-	71s
93	0	0	534.24689	0 1994	-	534.24689	-	-	71s
94	0	0	543.56742	0 2842	-	543.56742	-	-	80s
95	0	0	543.56742	0 2788	-	543.56742	-	-	80s
96	0	0	545.46019	0 1640	-	545.46019	-	-	83s
97	0	0	545.54904	0 1108	-	545.54904	-	-	84s
98	0	0	545.54904	0 1106	-	545.54904	-	-	84s
99	0	0	545.54904	0 1029	-	545.54904	-	-	85s
100	0	0	547.73621	0 1299	-	547.73621	-	-	93s
101	0	0	547.73621	0 1265	-	547.73621	-	-	93s
102	0	0	551.41592	0 2155	-	551.41592	-	-	97s
103	0	0	551.41592	0 2153	-	551.41592	-	-	97s
104	0	0	553.60600	0 1938	-	553.60600	-	-	98s
105	0	0	553.60600	0 1936	-	553.60600	-	-	98s
106	0	0	553.76517	0 1911	-	553.76517	-	-	100s
107	0	0	553.76517	0 1905	-	553.76517	-	-	100s
108	0	0	553.95816	0 2169	-	553.95816	-	-	101s
109	0	0	553.96374	0 2166	-	553.96374	-	-	101s
110	0	0	554.84314	0 2312	-	554.84314	-	-	106s
111	0	0	554.84314	0 2294	-	554.84314	-	-	106s
112	0	0	556.53622	0 2208	-	556.53622	-	-	108s
113	0	0	556.53622	0 2187	-	556.53622	-	-	108s
114	0	0	557.30987	0 2536	-	557.30987	-	-	111s
115	0	0	557.30987	0 2551	-	557.30987	-	-	111s
116	0	0	557.70971	0 2278	-	557.70971	-	-	112s
117	0	0	557.70971	0 2277	-	557.70971	-	-	112s
118	0	0	558.16088	0 2205	-	558.16088	-	-	113s
119	0	0	558.19273	0 2159	-	558.19273	-	-	114s
120	0	0	558.31319	0 2113	-	558.31319	-	-	114s
121	0	0	559.04449	0 2614	-	559.04449	-	-	115s
122	0	0	559.64234	0 2640	-	559.64234	-	-	116s
123	0	0	559.64234	0 2638	-	559.64234	-	-	116s
124	0	0	559.83944	0 2644	-	559.83944	-	-	117s
125	0	0	559.93469	0 2722	-	559.93469	-	-	117s
126	0	0	559.94751	0 2720	-	559.94751	-	-	118s
127	0	0	560.03996	0 2721	-	560.03996	-	-	118s
128	0	0	560.06811	0 2740	-	560.06811	-	-	118s
129	0	0	560.21089	0 2757	-	560.21089	-	-	118s
130	0	0	560.55006	0 2674	-	560.55006	-	-	119s
131	0	0	560.91710	0 2678	-	560.91710	-	-	120s
132	0	0	560.94053	0 2699	-	560.94053	-	-	120s
133	0	0	561.23511	0 2453	-	561.23511	-	-	121s
134	0	0	561.23511	0 2442	-	561.23511	-	-	121s
135	0	0	561.24491	0 2342	-	561.24491	-	-	122s
136	0	0	561.24491	0 2334	-	561.24491	-	-	122s
137	0	0	561.50446	0 2353	-	561.50446	-	-	126s
138	0	0	561.50446	0 2329	-	561.50446	-	-	126s
139	0	0	562.18576	0 2071	-	562.18576	-	-	128s
140	0	0	562.18576	0 2052	-	562.18576	-	-	128s
141	0	0	562.46091	0 2131	-	562.46091	-	-	129s
142	0	0	562.50679	0 2559	-	562.50679	-	-	129s
143	0	0	562.50726	0 2600	-	562.50726	-	-	130s
144	0	0	562.87355	0 2809	-	562.87355	-	-	134s
145	0	0	562.87355	0 2788	-	562.87355	-	-	134s
146	0	0	562.94973	0 2520	-	562.94973	-	-	136s
147	0	0	562.95364	0 2622	-	562.95364	-	-	137s
148	0	0	562.97580	0 2571	-	562.97580	-	-	140s
149	0	0	562.97580	0 2516	-	562.97580	-	-	140s
150	0	0	563.28215	0 1923	-	563.28215	-	-	142s
151	0	0	563.28215	0 1916	-	563.28215	-	-	143s
152	0	0	563.36677	0 2664	-	563.36677	-	-	143s
153	0	0	563.47334	0 2694	-	563.47334	-	-	146s
154	0	0	563.47334	0 2691	-	563.47334	-	-	146s
155	0	0	563.49922	0 2393	-	563.49922	-	-	147s
156	0	0	563.61587	0 2539	-	563.61587	-	-	148s
157	0	0	563.61587	0 2396	-	563.61587	-	-	148s
158	0	0	563.64523	0 2334	-	563.64523	-	-	150s
159	0	0	563.99099	0 2546	-	563.99099	-	-	152s
160	0	0	563.99099	0 2492	-	563.99099	-	-	152s
161	0	0	564.05938	0 2393	-	564.05938	-	-	153s
162	0	0	564.09192	0 2417	-	564.09192	-	-	154s
163	0	0	564.09192	0 2483	-	564.09192	-	-	155s

```
164      0    0 564.25071   0 1672      - 564.25071    -    - 160s
165      0    0 564.25071   0 1670      - 564.25071    -    - 160s
166      0    0 564.32802   0 1943      - 564.32802    -    - 161s
167      0    0 564.32802   0 1942      - 564.32802    -    - 161s
168      0    0 564.40792   0 2458      - 564.40792    -    - 163s
169      0    0 564.40792   0 2448      - 564.40792    -    - 164s
170      0    0 564.45355   0 2439      - 564.45355    -    - 165s
171      0    0 564.48699   0 2621      - 564.48699    -    - 165s
172      0    0 564.48699   0 2676      - 564.48699    -    - 166s
173      0    0 564.58541   0 2417      - 564.58541    -    - 172s
174      0    0 564.58541   0 2414      - 564.58541    -    - 172s
175      0    0 564.72808   0 2395      - 564.72808    -    - 173s
176      0    0 564.72808   0 2394      - 564.72808    -    - 173s
177      0    0 564.73274   0 2357      - 564.73274    -    - 174s
178      0    0 564.73274   0 2354      - 564.73274    -    - 175s
179      0    0 564.89444   0 2179      - 564.89444    -    - 180s
180      0    0 564.89444   0 1990      - 564.89444    -    - 181s
181      0    0 564.91542   0 2182      - 564.91542    -    - 184s
182      0    0 564.91542   0 2168      - 564.91542    -    - 184s
183      0    0 564.92709   0 2557      - 564.92709    -    - 185s
184      0    0 564.92709   0 2546      - 564.92709    -    - 185s
185      0    0 565.04565   0 1673      - 565.04565    -    - 188s
186      0    0 565.17331   0 1840      - 565.17331    -    - 189s
187      0    0 565.17331   0 1840      - 565.17331    -    - 189s
188      0    0 565.17571   0 1914      - 565.17571    -    - 190s
189      0    0 565.17571   0 1909      - 565.17571    -    - 191s
190      0    0 565.27988   0 1725      - 565.27988    -    - 194s
191      0    0 565.33389   0 1648      - 565.33389    -    - 195s
192      0    0 565.36830   0 1801      - 565.36830    -    - 196s
193      0    0 565.49394   0 2232      - 565.49394    -    - 197s
194      0    0 565.49394   0 2176      - 565.49394    -    - 197s
195      0    0 565.50207   0 2252      - 565.50207    -    - 198s
196      0    0 565.74425   0 1890      - 565.74425    -    - 201s
197      0    0 565.74425   0 1888      - 565.74425    -    - 201s
198      0    0 566.12222   0 1860      - 566.12222    -    - 204s
199      0    0 566.12222   0 1741      - 566.12222    -    - 204s
200      0    0 566.14389   0 1854      - 566.14389    -    - 205s
201      0    0 566.19854   0 1761      - 566.19854    -    - 206s
202      0    0 566.19895   0 1754      - 566.19895    -    - 207s
203      0    0 566.26030   0 1716      - 566.26030    -    - 210s
204      0    0 566.26030   0 1701      - 566.26030    -    - 210s
205      0    0 566.28884   0 2029      - 566.28884    -    - 212s
206      0    0 566.28884   0 2026      - 566.28884    -    - 212s
207      0    0 566.35680   0 2091      - 566.35680    -    - 213s
208      0    0 566.36031   0 2020      - 566.36031    -    - 214s
209      0    0 566.36031   0 2019      - 566.36031    -    - 214s
210      0    0 566.40536   0 2085      - 566.40536    -    - 218s
211      0    0 566.40536   0 2077      - 566.40536    -    - 218s
212      0    0 566.42358   0 2276      - 566.42358    -    - 219s
213      0    0 566.42358   0 2187      - 566.42358    -    - 220s
214      0    0 566.44340   0 2022      - 566.44340    -    - 223s
215      0    0 566.44340   0 2016      - 566.44340    -    - 223s
216      0    0 566.45467   0 2064      - 566.45467    -    - 224s
217      0    0 566.58751   0 2000      - 566.58751    -    - 227s
218      0    0 566.58751   0 1995      - 566.58751    -    - 227s
219      0    0 566.58751   0 1371      - 566.58751    -    - 230s
220      0    2 566.58751   0 1360      - 566.58751    -    - 245s
221     11   16 569.33582   3 675       - 569.33582    -  776 250s
222     88   97 593.37330  15 832       - 569.64248    -  245 255s
223    221  236 608.11628  35 199       - 569.64248    -  154 260s
224    320  325 634.00000  72 118       - 569.64248    -  165 265s
225    439  431 644.00000 105 266       - 569.64248    -  192 270s
226  *  464  395          89  930.0000000 569.64248 38.7%  190 270s
227    504  417 infeasible 110   930.00000 569.64248 38.7%  220 275s
228    599  501 644.00000 143 127 930.00000 569.64248 38.7%  232 281s
229    647  538 644.00000 172 110 930.00000 569.64248 38.7%  250 288s
230    663  567 644.00000 179 112 930.00000 569.64248 38.7%  262 291s
231  H 726  581           924.0000000 569.64248 38.4%  243 293s
232    730  616 644.00000 233 110 924.00000 569.64248 38.4%  248 295s
233  H 844  619           884.0000000 569.64248 35.6%  232 298s
234    858  678 644.00000 314 109 884.00000 569.64248 35.6%  234 301s
235  H 905  674           844.0000000 569.64248 32.5%  222 301s
236    929  721 644.00000 337 110 844.00000 569.64248 32.5%  221 306s
237   1066  779 644.00000 209 1371 844.00000 569.64248 32.5%  212 364s
238  H 1067 741           758.0000000 569.64248 24.8%  212 376s
239  H 1067 703           738.0000000 569.64248 22.8%  212 382s
240   1069  704 628.00000  60 513 738.00000 569.64248 22.8%  212 406s
241   1070  705 645.00000  24 1112 738.00000 569.64248 22.8%  211 415s
242   1071  705 592.18571  54 1172 738.00000 569.64248 22.8%  211 423s
243   1072  706 644.00000 280 304 738.00000 569.64248 22.8%  211 425s
244   1076  709 634.00000  68 481 738.00000 570.70415 22.7%  210 430s
245   1078  710 644.58824 149 498 738.00000 570.75503 22.7%  210 437s
246   1079  711 644.00000 170 580 738.00000 572.03803 22.5%  210 448s
247   1080  711 588.00000  41 836 738.00000 573.13608 22.3%  209 453s
```

```
248    1082  713  573.48807    4  931  738.00000  573.48807  22.3%  209  455s
249    1084  714  644.73529  267  983  738.00000  573.54910  22.3%  209  465s
250    1085  715  605.07870    9  368  738.00000  574.14464  22.2%  209  474s
251    1086  715  644.00000  166  477  738.00000  574.22380  22.2%  208  475s
252    1087  716  628.00000   85  687  738.00000  574.22998  22.2%  208  483s
253    1088  717  625.93277   76 1210  738.00000  575.20416  22.1%  208  495s
254    1090  718  598.11780    3  789  738.00000  575.67232  22.0%  208  505s
255    1091  719  628.00000   36  379  738.00000  575.77209  22.0%  207  518s
256  H 1091  683              698.0000000  575.77209  17.5%  207  520s
257    1093  684  620.78986   33  315  698.00000  575.86056  17.5%  207  538s
258    1095  685  631.14397   14  458  698.00000  575.91746  17.5%  207  543s
259    1096  686  592.04376   37  442  698.00000  575.96484  17.5%  206  557s
260    1097  687  644.58824  125  468  698.00000  575.97298  17.5%  206  563s
261    1098  687  640.00000   50  367  698.00000  576.02837  17.5%  206  575s
262    1099  688  608.45472   20  600  698.00000  576.03939  17.5%  206  582s
263    1100  689  634.00000   63  338  698.00000  576.04792  17.5%  206  591s
264    1101  689  644.00000  162  520  698.00000  576.04826  17.5%  206  596s
265    1102  690  590.50000   19  659  698.00000  576.05085  17.5%  205  605s
266    1103  691  644.14706  309  655  698.00000  576.05136  17.5%  205  610s
267    1104  691  644.00000  168  323  698.00000  576.05994  17.5%  205  618s
268    1105  692  644.00000  390  321  698.00000  576.05994  17.5%  205  624s
269  H 1105  657              618.0000000  576.05994  6.79%  205  625s
270  H 1105  623              598.0000000  576.05994  3.67%  205  628s
271    1106  624  598.00000   13  321  598.00000  576.05994  3.67%  205  631s
272    1107  626  598.00000  106 1371  598.00000  576.05994  3.67%  310  655s
273    1109  627  598.00000   30  286  598.00000  576.05994  3.67%  310  663s
274    1110  628  597.52989   17  352  598.00000  576.05994  3.67%  309  675s
275    1111  629  598.00000    8  247  598.00000  576.05994  3.67%  309  681s
276    1115  633  588.00000   41 1371  598.00000  577.34568  3.45%  330  705s
277    1120  638  598.00000   62 1371  598.00000  577.34568  3.45%  347  722s
278
279  Explored 1121 nodes (513344 simplex iterations) in 722.78 seconds (980.97 work units)
280  Thread count was 8 (of 8 available processors)
281
282  Solution count 9: 598 618 698 ... 930
283
284  Optimal solution found (tolerance 1.00e-04)
285  Best objective 5.980000000000e+02, best bound 5.980000000000e+02, gap 0.0000%
286  Optimal Obj:  598.0
287  Obj = 598.0
288  Solutions
289  Vessel i: 0:    li: 7,    pi: 7-14,    ai-di: 5-27,    taoi-deltai: 5-15,    periodi: 10,    taoPi_SP-deltaPi_SP: 5-8,    periodPi: 3,    betaNi: 6,    bi: 10,    Txijt: 70
     ,    o1i: 70,    o2i: 60,    o3i: -189,    o4i: 120,    Ti: 61
290  Vessel i: 1:    li: 6,    pi: 14-20,    ai-di: 11-28,    taoi-deltai: 11-16,    periodi: 5,    taoPi_SP-deltaPi_SP: 11-13,    periodPi: 2,    betaNi: 3,    bi: 5,    Txijt
     : 30,    o1i: 30,    o2i: 40,    o3i: -78,    o4i: 60,    Ti: 52
291  Vessel i: 2:    li: 7,    pi: 27-34,    ai-di: 13-54,    taoi-deltai: 13-42,    periodi: 29,    taoPi_SP-deltaPi_SP: 13-21,    periodPi: 8,    betaNi: 17,    bi: 29,
     Txijt: 203,    o1i: 203,    o2i: 160,    o3i: -567,    o4i: 340,    Ti: 136
292  Vessel i: 3:    li: 6,    pi: 13-19,    ai-di: 33-64,    taoi-deltai: 34-53,    periodi: 19,    taoPi_SP-deltaPi_SP: 34-39,    periodPi: 5,    betaNi: 11,    bi: 19,
     Txijt: 114,    o1i: 134,    o2i: 100,    o3i: -364,    o4i: 220,    Ti: 90
293  Vessel i: 4:    li: 7,    pi: 19-26,    ai-di: 27-65,    taoi-deltai: 27-53,    periodi: 26,    taoPi_SP-deltaPi_SP: 27-34,    periodPi: 7,    betaNi: 15,    bi: 26,
     Txijt: 182,    o1i: 182,    o2i: 140,    o3i: -513,    o4i: 300,    Ti: 109
294  Vessel i: 5:    li: 6,    pi: 7-13,    ai-di: 30-60,    taoi-deltai: 30-48,    periodi: 18,    taoPi_SP-deltaPi_SP: 30-35,    periodPi: 5,    betaNi: 14,    bi: 18,
     Txijt: 108,    o1i: 108,    o2i: 100,    o3i: -338,    o4i: 280,    Ti: 150
295  TimeSolveModel: 750.000000
296
297
298
299  TimeAll: 754.000000
300
301
302
303
```