```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=11909
 3
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
     01_My_Python_Code', 'E:/1 \\ \text{0} \\ \
      01_My_Python_Code'])
 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
     python code/01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
     Waiting 1s.....
12
13
     This is the R_2_1 _standard_test.xlsx optimization process solved by ENSGA-II algorithm.
14
15
     Start
16
17
     Before iteration:
18
         Read basic data
19
         Parameter setting:
20
             trail = 8
21
             Pop\_size = 10
             Tolerance iteration unchanged number = 5
23
             Chrom\_size = 6
             Iter_num_GA = 300
24
25
             Select_rate = 0.8
26
             Crossover rate = 0.95
             Mutation rate = 0.85
27
28
             Mu_oper_type = 2
29
             vessel_move_way = 2
30
             coefficient for Obj1= 1.0
             coefficient for Obj2= 1.0
31
             gen = 0
32
33
      Iteration begin:
34
35
     Beging the No. 0 iteration:
36
         obj[0] = 12.54 temp_best_value_gen = 12.54
37
         The No. 0 iteration is finished!
38
39
     Beging the No. 1 iteration:
40
         obj[gen-1] = 12.54 temp_best_value_gen = 8.77
         Yes, update solution and obj[gen] = 8.77
41
         solution chromosome =
42
43
             first level: [ [2.12 4.05]
             second level: [2. 0.]
44
             third level: [3. 4.]]
45
46
         The No. 1 iteration is finished!
47
48
     Beging the No. 2 iteration:
         obj[gen-1] = 8.77 temp_best_value_gen = 7.05
49
50
         Yes, update solution and obj[gen] = 7.05
51
         solution chromosome =
52
             first level: [ [2. 4.04]
53
             second level: [2. 0.]
54
             third level: [4. 8.]]
55
         The No. 2 iteration is finished!
56
57
     Beging the No. 3 iteration:
58
         obi[gen-1] = 7.05 temp best value gen = 7.05
59
         No, maintain solution and obj[gen] = 7.05, and the tolerance_counter = 1
60
         solution chromosome =
61
             first level: [ [2. 4.04]
62
             second level: [2. 0.]
             third level: [4. 8.]]
63
         The No. 3 iteration is finished!
64
65
     Beging the No. 4 iteration:
66
67
         obj[gen-1] = 7.05 temp_best_value_gen = 7.05
68
         No, maintain solution and obj[gen] = 7.05, and the tolerance_counter = 2
69
         solution chromosome =
             first level: [ [2. 4.04] second level: [2. 0.]
70
71
             third level: [4. 8.]]
73
         The No. 4 iteration is finished!
74
75
     Beging the No. 5 iteration:
         obi[gen-1] = 7.05 temp best value gen = 7.05
76
         No, maintain solution and obj[gen] = 7.05, and the tolerance_counter = 3
77
78
         solution chromosome =
             first level: [ [2. 4.04]
```

```
80
           second level: [2. 0.]
 81
          third level: [4. 8.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
        obj[gen-1] = 7.05 temp_best_value_gen = 7.05
No, maintain solution and obj[gen] = 7.05, and the tolerance_counter = 4
 85
 86
 87
        solution chromosome =
 88
          first level: [ [2. 4.04]
          second level: [2. 0.]
 89
 90
          third level: [4. 8.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 7.05 temp_best_value_gen = 7.05
 95
        No, maintain solution and obj[gen] = 7.05, and the tolerance_counter = 5
 96
        solution chromosome =
 97
          first level: [ [2. 4.04]
 98
          second level: [2. 0.]
 99
          third level: [4. 8.]]
100
        The No. 7 iteration is finished!
101
102
103
104 The iteration is terminated and then visulize the solution:
105
        solution chromosome =
106
          first level: [[2. 4.04]
          second level: [2. 0.] third level: [4. 8.]
107
108
109
        Objective function values and some other indicators:
110
          0bi0 = 3.00
                                Obj1 = 4.05
                                                        Obj0 + Obj1 = 7.05
          Total movement of crane: 2.05
111
112
          Total waiting time in berth position: 2.00
113
           Total index of q during berthing: 27.00
114
        Specific arrangement for each vessel:
115
                               li: 4.0
                                                    xi: 2.0
                                                                        bow of i: 0.0
                                                                                                    tail of i: 4.0
                                                                                                                              gama_i0: 2.0
                                                                                                                                                           gama_i1: 4.0
           V_id: 0
                     duration_time_i: 2.0
                                                         demand_i: 160.0
                                                                                        work load_i: 160.0
                                                                                                                         work load gap_i: 0
116
           V id: 1
                                                    xi: 4.0
                                                                        bow of i: 0.0
                                                                                                    tail of i: 8.0
                                                                                                                              gama_i0: 0.0
                               li: 8.0
                                                                                                                                                           gama_i1: 1.0
                                                         demand_i: 120.0
                                                                                        work load_i: 120.0
                                                                                                                         work load gap_i: 0
                     duration_time_i: 1.0
117
118 Algorithm finished and the total CPU time: 76 s
119 End
120
```