

```

1 "E:\1 \ \ \ \ \3 \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \2\6 \ \ \ \ \2 python code\01_My_Python_Code\Scripts\python.
   exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=5042
2
3 import sys; print('Python %s on %s' % (sys.version, sys.platform))
4 sys.path.extend(['E:\1 \ \ \ \ \3 \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \2\6 \ \ \ \ \2 python code\
   01_My_Python_Code', 'E:/1 \ \ \ \ \3 \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \2\6 \ \ \ \ \2 python code/
   01_My_Python_Code'])
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 \_LW\_ \ \ \ \ \2\6 \ \ \ \ \2 python code\01_My_Python_Code/
   main_BACASP_official_ENSGA-II.py', wdir='E:/1 \ \ \ \ \3 \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \1 \_LW\_ \ \ \ \ \2\6 \ \ \ \ \2
   python code\01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
11 Waiting 1s.....
12
13 This is the R_2_1_standerd_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 = 6
21     Pop_size = 20
22     Tolerance_iteration_unchanged_number = 8
23     Chrom_size = 6
24     Iter_num_GA = 300
25     Select_rate = 0.8
26     Crossover_rate = 0.85
27     Mutation_rate = 0.85
28     Mu_oper_type = 1
29     vessel_move_way = 1
30     coefficient for Obj1= 1.0
31     coefficient for Obj2= 1.0
32     gen = 0
33
34 Iteration begin:
35 Beging the No. 0 iteration:
36   obj[0] = 14.00   temp_best_value_gen = 14.00
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 14.00   temp_best_value_gen = 8.00
41   Yes, update solution and obj[gen] = 8.00
42   solution chromosome =
43     first level: [ [8. 4.]
44     second level: [3. 0.]
45     third level: [3. 2.] ]
46   The No. 1 iteration is finished!
47
48 Beging the No. 2 iteration:
49   obj[gen-1] = 8.00   temp_best_value_gen = 8.00
50   No, maintain solution and obj[gen] = 8.00 , and the tolerance_counter = 1
51   solution chromosome =
52     first level: [ [8. 4.]
53     second level: [3. 0.]
54     third level: [3. 2.] ]
55   The No. 2 iteration is finished!
56
57 Beging the No. 3 iteration:
58   obj[gen-1] = 8.00   temp_best_value_gen = 5.00
59   Yes, update solution and obj[gen] = 5.00
60   solution chromosome =
61     first level: [ [2. 8.]
62     second level: [1. 0.]
63     third level: [2. 3.] ]
64   The No. 3 iteration is finished!
65
66 Beging the No. 4 iteration:
67   obj[gen-1] = 5.00   temp_best_value_gen = 5.00
68   No, maintain solution and obj[gen] = 5.00 , and the tolerance_counter = 1
69   solution chromosome =
70     first level: [ [2. 8.]
71     second level: [1. 0.]
72     third level: [2. 3.] ]
73   The No. 4 iteration is finished!
74
75 Beging the No. 5 iteration:
76   obj[gen-1] = 5.00   temp_best_value_gen = 5.00
77   No, maintain solution and obj[gen] = 5.00 , and the tolerance_counter = 2
78   solution chromosome =
79     first level: [ [2. 8.]

```

```

80     second level: [1. 0.]
81     third level: [2. 3.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 5.00    temp_best_value_gen = 5.00
86     No, maintain solution and obj[gen] = 5.00 , and the tolerance_counter = 3
87     solution chromosome =
88         first level: [ [2. 8.]
89         second level: [1. 0.]
90         third level: [2. 3.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 5.00    temp_best_value_gen = 5.00
95     No, maintain solution and obj[gen] = 5.00 , and the tolerance_counter = 4
96     solution chromosome =
97         first level: [ [2. 8.]
98         second level: [1. 0.]
99         third level: [2. 3.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 5.00    temp_best_value_gen = 2.00
104     Yes, update solution and obj[gen] = 2.00
105     solution chromosome =
106         first level: [ [2. 8.]
107         second level: [0. 0.]
108         third level: [3. 3.] ]
109     The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 2.00    temp_best_value_gen = 2.00
113     No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 1
114     solution chromosome =
115         first level: [ [2. 8.]
116         second level: [0. 0.]
117         third level: [3. 3.] ]
118     The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 2.00    temp_best_value_gen = 2.00
122     No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 2
123     solution chromosome =
124         first level: [ [2. 8.]
125         second level: [0. 0.]
126         third level: [3. 3.] ]
127     The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130     obj[gen-1] = 2.00    temp_best_value_gen = 2.00
131     No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 3
132     solution chromosome =
133         first level: [ [2. 8.]
134         second level: [0. 0.]
135         third level: [3. 3.] ]
136     The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139     obj[gen-1] = 2.00    temp_best_value_gen = 2.00
140     No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 4
141     solution chromosome =
142         first level: [ [2. 8.]
143         second level: [0. 0.]
144         third level: [3. 3.] ]
145     The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
148     obj[gen-1] = 2.00    temp_best_value_gen = 2.00
149     No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 5
150     solution chromosome =
151         first level: [ [2. 8.]
152         second level: [0. 0.]
153         third level: [3. 3.] ]
154     The No. 13 iteration is finished!
155
156 Beging the No. 14 iteration:
157     obj[gen-1] = 2.00    temp_best_value_gen = 2.00
158     No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 6
159     solution chromosome =
160         first level: [ [2. 8.]
161         second level: [0. 0.]
162         third level: [3. 3.] ]
163     The No. 14 iteration is finished!

```

```

164
165 Beging the No. 15 iteration:
166 obj[gen-1] = 2.00 temp_best_value_gen = 2.00
167 No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 7
168 solution chromosome =
169 first level: [ [2. 8.]
170 second level: [0. 0.]
171 third level: [3. 3.] ]
172 The No. 15 iteration is finished!
173
174 Beging the No. 16 iteration:
175 obj[gen-1] = 2.00 temp_best_value_gen = 2.00
176 No, maintain solution and obj[gen] = 2.00 , and the tolerance_counter = 8
177 solution chromosome =
178 first level: [ [2. 8.]
179 second level: [0. 0.]
180 third level: [3. 3.] ]
181 The No. 16 iteration is finished!
182
183
184 -----
185 The iteration is terminated and then visulize the solution:
186 solution chromosome =
187 first level: [ [2. 8.]
188 second level: [0. 0.]
189 third level: [3. 3.] ]
190 Objective function values and some other indicators:
191 Obj0 = 2.00 Obj1 = 0.00 Obj0 + Obj1 = 2.00
192 Total movement of crane: 0.00
193 Total waiting time in berth position: 0.00
194 Total index of q during berthing: 37.00
195 Specific arrangement for each vessel:
196 V_id: 0 li: 4.0 xi: 2.0 bow of i: 0.0 tail of i: 4.0 gama_i0: 0.0 gama_i1: 3.0
197 duration_time_i: 3.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
198 V_id: 1 li: 8.0 xi: 8.0 bow of i: 4.0 tail of i: 12.0 gama_i0: 0.0 gama_i1: 2.0
199 duration_time_i: 2.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
199 Algorithm finished and the total CPU time: 627 s
200 End
201

```