


```

80     second level: [0. 2.]
81     third level: [4. 7.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 5.93     temp_best_value_gen = 5.93
86     No, maintain solution and obj[gen] = 5.93 , and the tolerance_counter = 2
87     solution chromosome =
88         first level: [ [2.03 5.01]
89         second level: [0. 2.]
90         third level: [4. 7.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 5.93     temp_best_value_gen = 5.93
95     No, maintain solution and obj[gen] = 5.93 , and the tolerance_counter = 3
96     solution chromosome =
97         first level: [ [2.03 5.01]
98         second level: [0. 2.]
99         third level: [4. 7.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 5.93     temp_best_value_gen = 4.86
104     Yes, update solution and obj[gen] = 4.86
105     solution chromosome =
106         first level: [ [2.14 5.01]
107         second level: [1. 0.]
108         third level: [3. 6.] ]
109     The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 4.86     temp_best_value_gen = 4.86
113     No, maintain solution and obj[gen] = 4.86 , and the tolerance_counter = 1
114     solution chromosome =
115         first level: [ [2.14 5.01]
116         second level: [1. 0.]
117         third level: [3. 6.] ]
118     The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 4.86     temp_best_value_gen = 4.86
122     No, maintain solution and obj[gen] = 4.86 , and the tolerance_counter = 2
123     solution chromosome =
124         first level: [ [2.14 5.01]
125         second level: [1. 0.]
126         third level: [3. 6.] ]
127     The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130     obj[gen-1] = 4.86     temp_best_value_gen = 4.86
131     No, maintain solution and obj[gen] = 4.86 , and the tolerance_counter = 3
132     solution chromosome =
133         first level: [ [2.14 5.01]
134         second level: [1. 0.]
135         third level: [3. 6.] ]
136     The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139     obj[gen-1] = 4.86     temp_best_value_gen = 4.86
140     No, maintain solution and obj[gen] = 4.86 , and the tolerance_counter = 4
141     solution chromosome =
142         first level: [ [2.14 5.01]
143         second level: [1. 0.]
144         third level: [3. 6.] ]
145     The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
148     obj[gen-1] = 4.86     temp_best_value_gen = 4.86
149     No, maintain solution and obj[gen] = 4.86 , and the tolerance_counter = 5
150     solution chromosome =
151         first level: [ [2.14 5.01]
152         second level: [1. 0.]
153         third level: [3. 6.] ]
154     The No. 13 iteration is finished!
155
156 Beging the No. 14 iteration:
157     obj[gen-1] = 4.86     temp_best_value_gen = 4.86
158     No, maintain solution and obj[gen] = 4.86 , and the tolerance_counter = 6
159     solution chromosome =
160         first level: [ [2.14 5.01]
161         second level: [1. 0.]
162         third level: [3. 6.] ]
163     The No. 14 iteration is finished!

```

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164
165
166 -----
167 The iteration is terminated and then visulize the solution:
168   solution chromosome =
169     first level: [ [2.14 5.01]
170     second level: [1. 0.]
171     third level: [3. 6.] ]
172 Objective function values and some other indicators:
173   Obj0 = 3.00      Obj1 = 2.24      Obj0 + Obj1 = 5.24
174   Total movement of crane: 1.24
175   Total waiting time in berth position: 1.00
176   Total index of q during berthing: 28.00
177 Specific arrangement for each vessel:
178   V_id: 0          li: 4.0          xi: 2.1          bow of i: 0.1          tail of i: 4.1          gama_i0: 1.0          gama_i1: 4.0
179   duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
180   V_id: 1          li: 8.0          xi: 5.0          bow of i: 1.0          tail of i: 9.0          gama_i0: 0.0          gama_i1: 1.0
181   duration_time_i: 1.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
182
181 Algorithm finished and the total CPU time: 347 s
182 End
183
```