



```

80     second level: [1. 0.]
81     third level: [2. 4.] ]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 6.50    temp_best_value_gen = 6.50
86     No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 1
87     solution chromosome =
88     first level: [ [2. 8.]
89     second level: [1. 0.]
90     third level: [2. 4.] ]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 6.50    temp_best_value_gen = 6.50
95     No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 2
96     solution chromosome =
97     first level: [ [2. 8.]
98     second level: [1. 0.]
99     third level: [2. 4.] ]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 6.50    temp_best_value_gen = 6.50
104    No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 3
105    solution chromosome =
106    first level: [ [2. 8.]
107    second level: [1. 0.]
108    third level: [2. 4.] ]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 6.50    temp_best_value_gen = 6.50
113    No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 4
114    solution chromosome =
115    first level: [ [2. 8.]
116    second level: [1. 0.]
117    third level: [2. 4.] ]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 6.50    temp_best_value_gen = 6.50
122    No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 5
123    solution chromosome =
124    first level: [ [2. 8.]
125    second level: [1. 0.]
126    third level: [2. 4.] ]
127    The No. 10 iteration is finished!
128
129    Beging the No. 11 iteration:
130    obj[gen-1] = 6.50    temp_best_value_gen = 6.50
131    No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 6
132    solution chromosome =
133    first level: [ [2. 8.]
134    second level: [1. 0.]
135    third level: [2. 4.] ]
136    The No. 11 iteration is finished!
137
138
139 -----
140    The iteration is terminated and then visulize the solution:
141    solution chromosome =
142    first level: [ [2. 8.]
143    second level: [1. 0.]
144    third level: [2. 4.] ]
145    Objective function values and some other indicators:
146    Obj0 = 4.00          Obj1 = 1.00          Obj0 + Obj1 = 5.00
147    Total movement of crane: 0.00
148    Total waiting time in berth position: 1.00
149    Total index of q during berthing: 35.00
150    Specific arrangement for each vessel:
151    V_id: 0             li: 4.0             xi: 2.0             bow of i: 0.0             tail of i: 4.0             gama_i0: 1.0             gama_i1: 5.0
152    duration_time_i: 4.0             demand_i: 160.0             work load_i: 160.0             work load gap_i: 0
153    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
154    duration_time_i: 2.0             demand_i: 120.0             work load_i: 120.0             work load gap_i: 0
155
156    Algorithm finished and the total CPU time: 271 s
157    End

```