



```

80     second level: [0. 2.]
81     third level: [4. 2.] ]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 7.00    temp_best_value_gen = 7.00
86     No, maintain solution and obj[gen] = 7.00 , and the tolerance_counter = 3
87     solution chromosome =
88     first level: [ [8. 4.]
89     second level: [0. 2.]
90     third level: [4. 2.] ]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 7.00    temp_best_value_gen = 1.50
95     Yes, update solution and obj[gen] = 1.50
96     solution chromosome =
97     first level: [ [2. 8.]
98     second level: [0. 0.]
99     third level: [4. 4.] ]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
104    No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 1
105    solution chromosome =
106    first level: [ [2. 8.]
107    second level: [0. 0.]
108    third level: [4. 4.] ]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
113    No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 2
114    solution chromosome =
115    first level: [ [2. 8.]
116    second level: [0. 0.]
117    third level: [4. 4.] ]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
122    No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 3
123    solution chromosome =
124    first level: [ [2. 8.]
125    second level: [0. 0.]
126    third level: [4. 4.] ]
127    The No. 10 iteration is finished!
128
129    Beging the No. 11 iteration:
130    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
131    No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 4
132    solution chromosome =
133    first level: [ [2. 8.]
134    second level: [0. 0.]
135    third level: [4. 4.] ]
136    The No. 11 iteration is finished!
137
138    Beging the No. 12 iteration:
139    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
140    No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 5
141    solution chromosome =
142    first level: [ [2. 8.]
143    second level: [0. 0.]
144    third level: [4. 4.] ]
145    The No. 12 iteration is finished!
146
147
148    -----
149    The iteration is terminated and then visulize the solution:
150    solution chromosome =
151    first level: [ [2. 8.]
152    second level: [0. 0.]
153    third level: [4. 4.] ]
154    Objective function values and some other indicators:
155    Obj0 = 1.00    Obj1 = 0.00    Obj0 + Obj1 = 1.00
156    Total movement of crane: 0.00
157    Total waiting time in berth position: 0.00
158    Total index of q during berthing: 43.00
159    Specific arrangement for each vessel:
160    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: 2.0
161    duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
162    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
163    duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0

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unknown

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162
163 Algorithm finished and the total CPU time: 335 s
164 End
165
```