1 "E:\1 □□□□\3 □□□□□\1 □□□□□□□\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=1269

2

3 import sys; print('Python %s on %s' % (sys.version, sys.platform))

4 sys.path.extend(['E:\\1 □□□□\\3 □□□□□\\1 □□□□□□□\\1 □□□□□□□□□\\1_□□□□□□_□□□□\\1_LW_□□□□□2\\6 □□□□□\\2 python code\\01_My_Python_Code', 'E:/1 □□□□/3 □□□□□/1 □□□□□□□/1 □□□□□□□□□/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 □□□□□□□□□/1_□□□□□□_□□□□/1_LW_□□□□□2/6 □□□□□/2 python code/01_My_Python_Code/main_BACASP_official_ENSGA-II.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□□/1 □□□□□□□□□/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 = 18

21   Pop_size = 30

22   Tolerance_iteration_unchanged_number = 5

23   Chrom_size = 6

24   Iter_num_GA = 300

25   Select_rate = 0.75

26   Crossover_rate = 0.95

27   Mutation rate = 0.75

28   Mu_oper_type = 1

29   vessel_move_way = 2

30   coefficient for Obj1= 0.5

31   coefficient for Obj2= 1.5

32   gen = 0

33

34 Iteration begin:

35 Beging the No. 0 iteration:

36   obj[0] = 11.00   temp_best_value_gen = 11.00

37   The No. 0 iteration is finished!

38

39 Beging the No. 1 iteration:

40   obj[gen-1] = 11.00   temp_best_value_gen = 8.00

41   Yes, update solution and obj[gen] = 8.00

42   solution chromosome =

43   first level: [[2. 8.]

44   second level: [0. 4.]

45   third level: [2. 7.]]

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: [[2. 8.]

53   second level: [0. 4.]

54   third level: [2. 7.]]

55   The No. 2 iteration is finished!

56

57 Beging the No. 3 iteration:

58   obj[gen-1] = 8.00   temp_best_value_gen = 8.00

59   No, maintain solution and obj[gen] = 8.00 , and the tolerance_counter = 2

60   solution chromosome =

61   first level: [[2. 8.]

62   second level: [0. 4.]

63   third level: [2. 7.]]

64   The No. 3 iteration is finished!

65

66 Beging the No. 4 iteration:

67   obj[gen-1] = 8.00   temp_best_value_gen = 8.00

68   No, maintain solution and obj[gen] = 8.00 , and the tolerance_counter = 3

69   solution chromosome =

70   first level: [[2. 8.]

71   second level: [0. 4.]

72   third level: [2. 7.]]

73   The No. 4 iteration is finished!

74

75 Beging the No. 5 iteration:

76   obj[gen-1] = 8.00   temp_best_value_gen = 8.00

77   No, maintain solution and obj[gen] = 8.00 , and the tolerance_counter = 4

78   solution chromosome =

79   first level: [[2. 8.]

```
 80        second level:  [0. 4.]
 81        third level:  [2. 7.] ]
 82     The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85     obj[gen-1] = 8.00    temp_best_value_gen = 8.00
 86     No, maintain solution  and obj[gen] = 8.00 , and the tolerance_counter = 5
 87     solution chromosome =
 88        first level: [ [2. 8.]
 89        second level:  [0. 4.]
 90        third level:  [2. 7.] ]
 91     The No. 6  iteration is finished!
 92
 93
 94  -------------------------------------------------------------------------------
 95  The iteration is terminated and then visulize the solution:
 96     solution chromosome =
 97        first level: [ [2. 8.]
 98        second level:  [0. 4.]
 99        third level:  [2. 7.] ]
100     Objective function values and some other indicators:
101        Obj0 = 4.00          Obj1 = 4.00          Obj0 + Obj1 = 8.00
102        Total movement of crane: 0.00
103        Total waiting time in berth position: 4.00
104        Total index of q during berthing: 43.00
105     Specific arrangement for each vessel:
106        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: 4.0
                 duration_time_i: 4.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
107        V_id: 1          li: 8.0          xi: 8.0          bow of i: 4.0          tail of i: 12.0          gama_i0: 4.0          gama_i1: 5.0
                 duration_time_i: 1.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
108
109  Algorithm finished and the total CPU time: 198 s
110  End
111
```