```
"E:\1 □□□□\3 □□□□□\1 □□□□□□\1 □□□□□□□\1_□□□□□□_□□□□\1_LW _□□□□\4 □□□□\3 python_code\1 exzample\2 □□□□□□\9 Code for this paper\Scripts\python.exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=10719

import sys; print('Python %s on %s' % (sys.version, sys.platform))
sys.path.extend(['E:\\1 □□□□\\3 □□□□□□\\1 □□□□□□□□\\1_□□□□□□_□□□□\\1_LW _□□□□\\4 □□□□\\3 python_code\\9 Code for this paper', 'E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper'])

PyDev console: starting.

Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
>>> runfile('E:/1 □□□□/3 □□□□□/1 □□□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper/main_RO_BDC.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□□/1 □□□□□□□□/1_□□□□□□□_□□□□/1_LW _□□□□/4 □□□□/3 python_code/9 Code for this paper')
Backend TkAgg is interactive backend. Turning interactive mode on.
Waiting 5s.....

Optimize the  ./R_15_1.xlsx  instance by BDC

      Master protblem status =  2 , is Optimal
      sol_MP_obj =  528.0
The initial lb =  -inf       ub =  inf

The current iteration cnt =  0
   Optimization was stopped with status 9
      Dual problem status =  9
      Add optimal cut
      Master protblem status =  2 , is Optimal
      Deterministic Sub problem Status=  2 , is Optimal
      lb =  565.7454724051497                ub =  565.7454724051497
      MPObj =  565.7454724051497     MPObj_Remove_Hua =  560.0     DualSPObj =  5.74547240514967     Hua =  5.74547240514967     Deterministic_SP_SPObj =  439.0

ub - lb =  0.0

Iteration cycle stopped by termination criterion 1: Because ub - lb <= eps, the iteration stop, and cnt =  0
    i:  0.0  l_i:  6.0  p_i:  0.0  aI_i:  1.0       sol_a_i:  1.0  sol_g_i:  0.0  d_i:  15.0  sol_taoi:  1.0  sol_deltai:  13.0  sol_deltai - sol_taoi:  12.0  sol_taoP:  1.0  sol_deltaP:  5.0  sol_deltaP - sol_taoP:  4.0  cl_i:  2917497.0     sol_c_i:  2917497.0  sol_gp_i:  0.0  total work:  3163728.0  wasted work:  0.9339526027521962
    i:  1.0  l_i:  6.0  p_i:  6.0  aI_i:  5.0       sol_a_i:  5.0  sol_g_i:  0.0  d_i:  11.0  sol_taoi:  5.0  sol_deltai:  9.0  sol_deltai - sol_taoi:  4.0  sol_taoP:  5.0  sol_deltaP:  6.0  sol_deltaP - sol_taoP:  1.0  cl_i:  1036171.0     sol_c_i:  1036171.0  sol_gp_i:  0.0  total work:  1186398.0  wasted work:  0.5698100468814007
    i:  2.0  l_i:  7.0  p_i:  21.0  aI_i:  6.0       sol_a_i:  6.0  sol_g_i:  0.0  d_i:  20.0  sol_taoi:  6.0  sol_deltai:  18.0  sol_deltai - sol_taoi:  12.0  sol_taoP:  6.0  sol_deltaP:  8.0  sol_deltaP - sol_taoP:  2.0  cl_i:  3020678.0     sol_c_i:  3020678.0  sol_gp_i:  0.0  total work:  3163728.0  wasted work:  0.5425877319415575
    i:  3.0  l_i:  6.0  p_i:  28.0  aI_i:  10.0       sol_a_i:  10.0  sol_g_i:  0.0  d_i:  16.0  sol_taoi:  10.0  sol_deltai:  14.0  sol_deltai - sol_taoi:  4.0  sol_taoP:  10.0  sol_deltaP:  11.0  sol_deltaP - sol_taoP:  1.0  cl_i:  1003327.0     sol_c_i:  1003327.0  sol_gp_i:  0.0  total work:  1318220.0  wasted work:  1.1943871280969793
    i:  4.0  l_i:  5.0  p_i:  12.0  aI_i:  15.0       sol_a_i:  15.0  sol_g_i:  0.0  d_i:  34.0  sol_taoi:  15.0  sol_deltai:  32.0  sol_deltai - sol_taoi:  17.0  sol_taoP:  15.0  sol_deltaP:  18.0  sol_deltaP - sol_taoP:  3.0  cl_i:  4430235.0     sol_c_i:  4430235.0  sol_gp_i:  0.0  total work:  4481948.0  wasted work:  0.1961470771191455
    i:  5.0  l_i:  6.0  p_i:  5.0  aI_i:  16.0       sol_a_i:  16.0  sol_g_i:  0.0  d_i:  25.0  sol_taoi:  16.0  sol_deltai:  23.0  sol_deltai - sol_taoi:  7.0  sol_taoP:  16.0  sol_deltaP:  19.0  sol_deltaP - sol_taoP:  3.0  cl_i:  1727656.0     sol_c_i:  1727656.0  sol_gp_i:  0.0  total work:  1845508.0  wasted work:  0.4470118796558996
    i:  6.0  l_i:  6.0  p_i:  0.0  aI_i:  24.0       sol_a_i:  24.0  sol_g_i:  0.0  d_i:  38.0  sol_taoi:  24.0  sol_deltai:  36.0  sol_deltai - sol_taoi:  12.0  sol_taoP:  24.0  sol_deltaP:  28.0  sol_deltaP - sol_taoP:  4.0  cl_i:  3144664.0     sol_c_i:  3144664.0  sol_gp_i:  0.0  total work:  3163728.0  wasted work:  0.07230962965210663
    i:  7.0  l_i:  7.0  p_i:  17.0  aI_i:  26.0       sol_a_i:  26.0  sol_g_i:  0.0  d_i:  34.0  sol_taoi:  26.0  sol_deltai:  32.0  sol_deltai - sol_taoi:  6.0  sol_taoP:  26.0  sol_deltaP:  27.0  sol_deltaP - sol_taoP:  1.0  cl_i:  1536740.0     sol_c_i:  1536740.0  sol_gp_i:  0.0  total work:  1581864.0  wasted work:  0.17115504240566826
    i:  8.0  l_i:  5.0  p_i:  7.0  aI_i:  28.0       sol_a_i:  32.0  sol_g_i:  0.8  d_i:  61.0  sol_taoi:  32.0  sol_deltai:  53.0  sol_deltai - sol_taoi:  21.0  sol_taoP:  32.0  sol_deltaP:  38.0  sol_deltaP - sol_taoP:  6.0  cl_i:  5432806.0     sol_c_i:  6698297.2  sol_gp_i:  0.8  total work:  6722922.0  wasted work:  0.09340170836430874
    i:  9.0  l_i:  7.0  p_i:  12.0  aI_i:  31.0       sol_a_i:  34.2  sol_g_i:  0.4  d_i:  54.0  sol_taoi:  35.0  sol_deltai:  40.0  sol_deltai - sol_taoi:  5.0  sol_taoP:  35.0  sol_deltaP:  36.0  sol_deltaP - sol_taoP:  1.0  cl_i:  1122221.0     sol_c_i:  1544051.4  sol_gp_i:  0.4  total work:  1581864.0  wasted work:  0.14342294912837042
    i:  10.0  l_i:  5.0  p_i:  29.0  aI_i:  33.0       sol_a_i:  39.0  sol_g_i:  0.6  d_i:  72.0  sol_taoi:  39.0  sol_deltai:  56.0  sol_deltai - sol_taoi:  17.0  sol_taoP:  39.0  sol_deltaP:  43.0  sol_deltaP - sol_taoP:  4.0  cl_i:  4319864.0     sol_c_i:  4319864.0  sol_gp_i:  0.0  total work:  4481948.0  wasted work:  0.6147835717861966
    i:  11.0  l_i:  6.0  p_i:  19.0  aI_i:  33.0       sol_a_i:  37.2  sol_g_i:  0.6  d_i:  65.0  sol_taoi:  38.0  sol_deltai:  54.0  sol_deltai - sol_taoi:  16.0  sol_taoP:  38.0  sol_deltaP:  43.0  sol_deltaP - sol_taoP:  5.0  cl_i:  3993564.0     sol_c_i:  5839072.0  sol_gp_i:  1.0  total work:  6063812.0  wasted work:  0.852437377675957
    i:  12.0  l_i:  6.0  p_i:  12.0  aI_i:  38.0       sol_a_i:  42.2  sol_g_i:  0.6  d_i:  63.0  sol_taoi:  43.0  sol_deltai:  52.0  sol_deltai - sol_taoi:  9.0  sol_taoP:  43.0  sol_deltaP:  45.0  sol_deltaP - sol_taoP:  2.0  cl_i:  2342507.0     sol_c_i:  2342507.0  sol_gp_i:  0.0  total work:  2372796.0  wasted work:  0.11488598261291742
    i:  13.0  l_i:  7.0  p_i:  0.0  aI_i:  45.0       sol_a_i:  48.6  sol_g_i:  0.6  d_i:  72.0  sol_taoi:  49.0  sol_deltai:  62.0  sol_deltai - sol_taoi:  13.0  sol_taoP:  49.0  sol_deltaP:  54.0  sol_deltaP - sol_taoP:  5.0  cl_i:  3386423.0     sol_c_i:  4440999.0  sol_gp_i:  0.8  total work:  4481948.0  wasted work:  0.1553192941997542
    i:  14.0  l_i:  5.0  p_i:  14.0  aI_i:  50.0       sol_a_i:  53.6  sol_g_i:  0.4  d_i:  82.0  sol_taoi:  54.0  sol_deltai:  66.0  sol_deltai - sol_taoi:  12.0  sol_taoP:  54.0  sol_deltaP:  58.0  sol_deltaP - sol_taoP:  4.0  cl_i:  2979427.0     sol_c_i:  5088579.0  sol_gp_i:  1.0  total work:  6063812.0  wasted work:  3.6990525102031526

Optimal objective =  999.0
```

```
Time: 399.000000
```