```
"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=30274

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_DeterministicModel.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.....
Gurobi Optimizer version 10.0.2 build v10.0.2rc0 (win64)

CPU model: 11th Gen Intel(R) Core(TM) i7-11370H @ 3.30GHz, instruction set [SSE2|AVX|AVX2|AVX512]
Thread count: 4 physical cores, 8 logical processors, using up to 8 threads

Optimize a model with 624623 rows, 47910 columns and 1843346 nonzeros
Model fingerprint: 0xcb3b5a71
Variable types: 0 continuous, 47910 integer (40308 binary)
Coefficient statistics:
  Matrix range     [1e-01, 1e+15]
  Objective range  [1e+00, 5e+01]
  Bounds range     [1e+00, 1e+00]
  RHS range        [1e+00, 2e+15]
Warning: Model contains large matrix coefficient range
Warning: Model contains large rhs
         Consider reformulating model or setting NumericFocus parameter
         to avoid numerical issues.
Presolve removed 469292 rows and 28825 columns (presolve time = 5s) ...
Presolve removed 531953 rows and 34624 columns (presolve time = 10s) ...
Presolve removed 531957 rows and 34628 columns
Presolve time: 10.07s
Presolved: 92666 rows, 13282 columns, 275500 nonzeros
Variable types: 0 continuous, 13282 integer (13081 binary)

Deterministic concurrent LP optimizer: primal and dual simplex (primal and dual model)
Showing first log only...

Root relaxation presolved: 13274 rows, 105924 columns, 288269 nonzeros


Root simplex log...

Iteration    Objective       Primal Inf.    Dual Inf.      Time
       0   -9.0620000e+03   0.000000e+00   7.255502e+04     11s
Concurrent spin time: 0.10s

Solved with dual simplex (primal model)

Root relaxation: objective 6.043834e+02, 2008 iterations, 0.80 seconds (0.70 work units)

    Nodes    |    Current Node    |     Objective Bounds      |     Work
 Expl Unexpl |  Obj  Depth IntInf | Incumbent    BestBd   Gap | It/Node Time

     0     0  604.38345    0  112          -  604.38345      -     -   12s
     0     0  616.78806    0  780          -  616.78806      -     -   14s
     0     0  616.78806    0  776          -  616.78806      -     -   14s
     0     0  622.17500    0  682          -  622.17500      -     -   14s
     0     0  622.21658    0  653          -  622.21658      -     -   15s
     0     0  622.25991    0  647          -  622.25991      -     -   15s
     0     0  622.30005    0  561          -  622.30005      -     -   15s
     0     0  622.30005    0  559          -  622.30005      -     -   15s
     0     0  629.28369    0  387          -  629.28369      -     -   17s
     0     0  629.28369    0  382          -  629.28369      -     -   17s
     0     0  629.30706    0  430          -  629.30706      -     -   17s
     0     0  632.91250    0  424          -  632.91250      -     -   18s
     0     0  632.91250    0  407          -  632.91250      -     -   18s
     0     0  637.99999    0  311          -  637.99999      -     -   20s
     0     0  637.99999    0  266          -  637.99999      -     -   21s
     0     0  637.99999    0  265          -  637.99999      -     -   21s
     0     0  637.99999    0  350          -  637.99999      -     -   22s
H    0     0                1318.0000000  637.99999  51.6%     -   22s
     0     0  637.99999    0  286 1318.00000  637.99999  51.6%     -   23s
     0     0  637.99999    0   30 1318.00000  637.99999  51.6%     -   25s
H    0     0                1198.0000000  637.99999  46.7%     -   26s
     0     0  637.99999    0   46 1198.00000  637.99999  46.7%     -   26s
H    0     0                638.0000000  637.99999  0.00%     -   27s
     0     0  637.99999    0   62  638.00000  637.99999  0.00%     -   27s

```

```
Cutting planes:
  Learned: 234
  Gomory: 28
  Cover: 305
  Implied bound: 34
  Clique: 116
  MIR: 102
  StrongCG: 40
  Flow cover: 33
  GUB cover: 43
  Zero half: 11
  RLT: 96
  Relax-and-lift: 110
  BQP: 6

Explored 1 nodes (16913 simplex iterations) in 27.70 seconds (37.32 work units)
Thread count was 8 (of 8 available processors)

Solution count 3: 638 1198 1318

Optimal solution found (tolerance 1.00e-04)
Best objective 6.380000000000e+02, best bound 6.380000000000e+02, gap 0.0000%
Optimal Obj:  638.0
Obj = 638.0
Solutions
Vessel i: 0:    li: 6,    pi: 8-14,    ai-di: 2-23,    taoi-deltai: 2-25,    periodi: 23,    taoPi_SP-deltaPi_SP: 2-8,    periodPi: 6,    betaNi: 14,    bi: 23,    Txijt: 138,    o1i: 178,    o2i: 120,    o3i: -442,    o4i: 280,    Ti: 136
Vessel i: 1:    li: 7,    pi: 14-21,    ai-di: 8-17,    taoi-deltai: 8-16,    periodi: 8,    taoPi_SP-deltaPi_SP: 8-11,    periodPi: 3,    betaNi: 4,    bi: 8,    Txijt: 56,    o1i: 56,    o2i: 60,    o3i: -135,    o4i: 80,    Ti: 61
Vessel i: 2:    li: 7,    pi: 7-14,    ai-di: 34-42,    taoi-deltai: 34-41,    periodi: 7,    taoPi_SP-deltaPi_SP: 34-36,    periodPi: 2,    betaNi: 4,    bi: 7,    Txijt: 49,    o1i: 49,    o2i: 40,    o3i: -135,    o4i: 80,    Ti: 34
Vessel i: 3:    li: 7,    pi: 17-24,    ai-di: 40-58,    taoi-deltai: 40-56,    periodi: 16,    taoPi_SP-deltaPi_SP: 40-46,    periodPi: 6,    betaNi: 9,    bi: 16,    Txijt: 112,    o1i: 112,    o2i: 120,    o3i: -270,    o4i: 180,    Ti: 142
Vessel i: 4:    li: 6,    pi: 11-17,    ai-di: 47-59,    taoi-deltai: 47-60,    periodi: 13,    taoPi_SP-deltaPi_SP: 47-52,    periodPi: 5,    betaNi: 8,    bi: 13,    Txijt: 78,    o1i: 98,    o2i: 100,    o3i: -208,    o4i: 160,    Ti: 150
Vessel i: 5:    li: 7,    pi: 27-34,    ai-di: 50-67,    taoi-deltai: 50-69,    periodi: 19,    taoPi_SP-deltaPi_SP: 50-55,    periodPi: 5,    betaNi: 11,    bi: 19,    Txijt: 133,    o1i: 173,    o2i: 100,    o3i: -378,    o4i: 220,    Ti: 115
TimeSolveModel: 50.000000



TimeAll: 54.000000
```