**Conclusions**

We propose a more efficient solution to the toll merging problem with a better shape. It has certain theoretical reference and guidance value to solve the existing problem of traffic congestion and high construction cost in the process of merging.

Given the toll plaza’s demand of traffic throughput, discrete traffic flow propagation model can be easily to sum the vehicle flow (sum each cell’s vehicle flow to get the overall vehicle flow directly). Furthermore, discuss the change of vehicle flow under the condition of large and small flow and analyze several kinds of merging methods, we address a conclusion that the multiple double-sides merging is optimal. With the increase of the number of autonomous vehicles, the vehicle flow of the road is reduced, which imposes higher requirements on the capacity of the toll plaza. Different toll methods have great influence on road capacity and additional electronic toll collection booths can increase traffic density.

Our model has good robustness and feasibility to solve the problem of merging in toll plaza and has been tested. However，the intelligence of the autonomous vehicles was neglected when solving the problem of increasing proportion of autonomous vehicles. Our model only considered the distance between the vehicle and the obstruction shows its limitation and still needs to carry out a further study in the future.