Research on Morning Commuting Behavior under Autonomous Vehicle Environment Based on Activity Method

Authors : Qing Dai, Zhengkui Lin, Jiajia Zhang, Yi Qu

Abstract : Based on activity method, this paper focuses on morning commuting behavior when commuters travel with autonomous vehicles (AVs). Firstly, a net utility function of commuters is constructed by the activity utility of commuters at home, in car and at workplace, and the disutility of travel time cost and that of schedule delay cost. Then, this net utility function is applied to build an equilibrium model. Finally, under the assumption of constant marginal activity utility, the properties of equilibrium are analyzed. The results show that, in autonomous driving, the starting and ending time of morning peak and the number of commuters who arrive early and late at workplace are the same as those in manual driving. In automatic driving, however, the departure rate of arriving early at workplace is higher than that of manual driving, while the departure rate of arriving late is just the opposite. In addition, compared with manual driving, the departure time of arriving at workplace on time is earlier and the number of people queuing at the bottleneck is larger in automatic driving. However, the net utility of commuters and the total net utility of system in automatic driving are greater than those in manual driving.