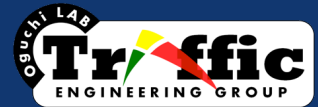


Research on lane-use model for highway basic segments

高速道路車線利用モデルに関する研究

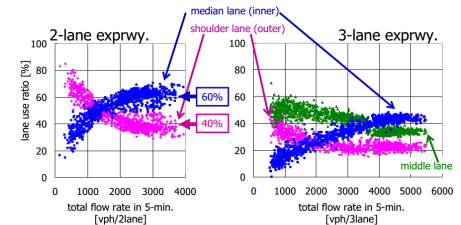


東京大学 生産技術研究所 大口研究室(交通工学) 楊燕
<http://www.transport.iis.u-tokyo.ac.jp/>



Lane-use rate of inner lane increases with flow rate increase

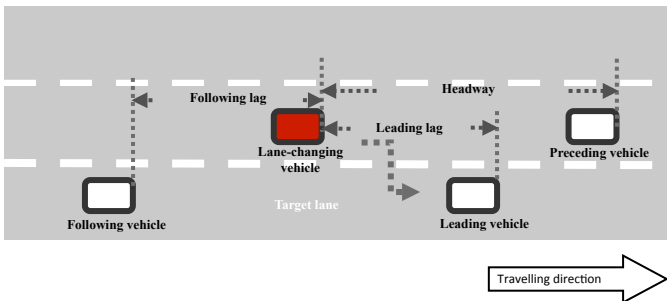
One of the biggest reasons of congestion on highway basic segments is that the unbalanced lane use reduces the stability of traffic flow and makes it more vulnerable for capacity drop. Lane-use rate of inner lane increases with the traffic flow rate increase, while those of outer lane decrease.



Simulation model for lane-use behavior

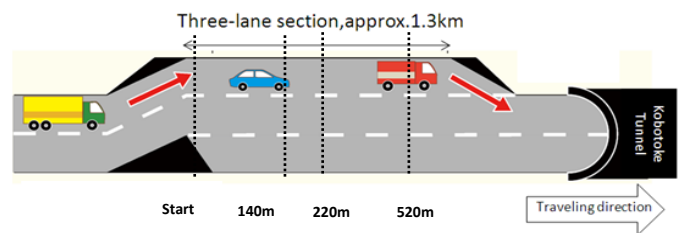
The simulation model for lane-use behavior is consisted with two parts: Car following model and Lane-changing model.

- Car following model: Vehicles enter the segment with their desired speed before the time headway to preceding vehicle is smaller than a set value. Afterwards, their speed is suppressed to the speed of preceding vehicle and attempt to change lane.
- Lane-changing model: Vehicles change lane if following lag and leading lag on target lane is bigger than set values.



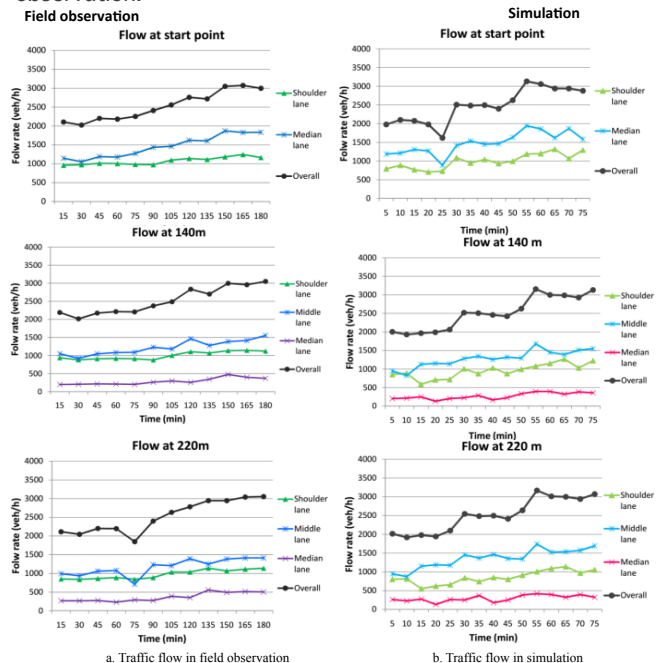
Field survey of real lane-use behavior

Field observation data is extracted from videos recorded at the Chuo Expressway in Japan. A new lane is added to a 2-lanes/ direction basic freeway segment at median side. Videos are taken at 4 locations: the start point, 140m, 220m and 520m from the start point of 3-lane segment. 83 lane changes are observed during 13:00 to 14:30 at 220m from the start point.



Calibration of lane-use model

Lane-use model is calibrated with lane-wise flow rate in field observation.



Further utility of lane-use model

Lane-use model can further be used to test the influence of different entering headway and speed distribution of vehicles to obtain a better knowledge for designing the additional lane. It can also be used to study general features of lane-use and the possible influence of potential control methods.

