

Tazeen Fatema

Thesis

Probabilistic Design of Freeway Speed Change Lanes Considering Acceleration and Gap Acceptance Behaviour

Abstract:

An adequate length of entrance speed change lanes (SCL) is required for vehicles' acceleration and gap searching purpose so that they can merge onto the freeway comfortably. The current design guides use a deterministic approach and consider the entrance speed, merging speed and acceleration factors for the determination of SCL length. The present research introduces a reliability-based probabilistic design approach for the SCL length considering both acceleration and gap searching behaviour of drivers during the merging process. A microscopic simulation technique is developed for the application of the probabilistic approach, and the outcome provides the probability of non-compliance (PNC) that quantifies the SCL drivers' uncomfortable merging. Different PNC measures are attached to the study sites considered in the present research work, which can be potentially used for evaluating the sites' safety performance. A case study is presented for the determination of PNC associated with the SCL length recommended in the North American design guides. A sensitivity analysis is also presented to examine the effect of the different model parameters.

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Degree

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