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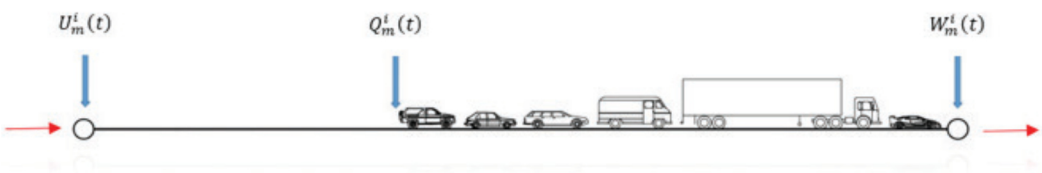
A new mesoscopic simulation model for dynamic network loading and spillback queuing assessment in a multiclass environment based on the vehicular type

Traffic flow modelling is the most significant component undertaken by the static and the dynamic network loading (DNL) models in the traffic assignment. DNL models represent a non-linear relationship between each link flow and its path flow, as they are the fundamental element in estimating the dynamic interaction between demand and supply in oversaturation condition. Moreover, the solution for DNL problems is necessary for generating the dynamic traffic assignment (DTA) models. Dynamic models can be characterised according to the simulation details level: microscopic, macroscopic or mesoscopic models. Many different aspects can be included within the dynamic network loading models such as the multiclass property. This thesis proposes a new dynamic network loading model which simulates traffic dynamics (speeds, densities, flows, queues, etc.) explicitly, through modelling the multiclass traffic flow considering the discrete mesoscopic simulation. The proposed model is capable of using two speed-density relations; Greenshields and the triangular-shaped fundamental diagram to propagate the flow. FIFO holds between the vehicles in the same class and creeping speed is assumed to avoid circulation blockage in the oversaturation conditions. For assessing the real-time queuing spillback, the proposed model is applied to a simple network. Moreover, the proposed model is compared to a commercial traffic simulator to highlight its performance in the oversaturation conditions.



Key Characteristics

Congestion • Flow propagation • Queue spillback • Multiclass mesoscopic simulation