

# Abstract

Modelling of acceleration/deceleration (A/D) behaviour of vehicles are important for various traffic engineering related works like intersection design, deceleration lane design, ramp design, traffic simulation modelling, vehicular emission modelling, instantaneous fuel consumption rate modelling, etc. In this present study, A/D behaviour of various vehicle types (mid size truck, motorized three wheeler, motorized two wheeler, diesel car and petrol car) are analyzed. Further, it explores the impact of driver attributes (such as driver age, driving experience and driver education) on A/D characteristics. Vehicular tailpipe emissions and delays at signalized intersection have long been understood to have been affected by vehicle A/D. Hence the experiments are also conducted to understand the impact of A/D on vehicular tailpipe emission and average delay at signalized intersection. Brief summary of main findings of this study is presented in following section.

This study is divided in four parts: (i) acceleration behaviour of vehicles, (ii) deceleration behaviour of vehicles, (iii) effect of driver attributes on acceleration/deceleration of mid size truck, and (iv) impact of A/D on vehicular tail pipe emission and average delay at signalized intersection. It was observed that different vehicle types have different A/D behaviour. It was also found that A/D behaviour also depends on the vehicle's desired (or maximum). The salient points that come out from each part of study are:

- The acceleration behaviour of vehicles varies with vehicle type. It is found that the existing models of acceleration-speed failed to describe the acceleration-speed data observed in this study. Hence new models are proposed.
- The deceleration behaviour of vehicles also varies with vehicle type. It is found that the existing models of deceleration, explained speed time relationship during deceleration which is not enough to describe actual deceleration behaviour. Hence new models are proposed.
- Acceleration/deceleration behaviour is found to be influenced by driver attributes such driver age, driving experience and education. The impacts of these attributes on acceleration-deceleration are quantified in detail.
- The dependence of car tailpipe emission on acceleration/deceleration was estimated. It is observed that car tailpipe emission is sensitive to speed at particular acceleration level. Impact of deceleration on car tail pipe emission couldn't be observed. The average delay at signalized intersection was also affected by car acceleration/deceleration