ABSTRACT

Saturation flow rate plays a major role in the performance evaluation of a signalized intersection. In urban areas, the multi-modal traffic environment affects the saturation flow rate. In the present study the Indian urban traffic is grouped into two categories based on the maneuverability namely Highly Maneuverable Vehicles (HMV) and others. Those vehicles which have a high degree of lateral and longitudinal freedom are called Highly Maneuverable Vehicles (HMV). Motorized 2/3 wheelers and human powered bicycles are grouped under this category in the present study. Saturated green time studies are conducted at selected signalized intersections of Hyderabad city and the data collected is analysed for the saturation flow rates. The analysis established that the saturation flow rate depends not only on the width available for the movement under consideration but also on the proportion of HMV in the traffic.

The study resulted in the development of statistical models to explain the relationship between the saturation flow rate in veh/hour and the two independent variables, the width available for movement and the proportion of HMV. It is observed that the saturation flow rate increases with the increase in any of the two variables. A parameter called Saturation Flow Ratio is introduced in the study. This represents the saturation flow rate per meter width and the units are veh/hour/m. Saturation Flow Ratio reflects the longitudinal and lateral adjustments exhibited by the vehicles over varied widths. When the width available for movement is small, the vehicles are observed to move close to each other forming a dense platoon, thereby increasing the Saturation Flow Ratio. When the width available is large, the vehicles maintain more comfortable spacings resulting in low Saturation Flow Ratio. Evidently the high proportion of HMV is responsible for such a behaviour. An artificial neural
network model is developed as a part of the study. The model is formulated in C language. The model is capable of predicting the Saturation Flow Rate at a signalized urban intersection. The inputs to the model are the proportion of highly maneuverable vehicle group and width of subject lane group. The ANN model predicts the Saturation Flow Rate from a given approach. The ANN model is validated and prediction of Saturation Flow Rate from a given approach is carried out for different proportions of highly maneuverable vehicle groups and varied widths of subject lane group.

The study has established that the prediction capability of Saturation Flow Rate by ANN model is 29.67 percent more than multiple linear regression model and 31.11 percent more than multiple non linear regression model.