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Abstract:

The two-fluid model for vehicular traffic flow explains the traffic on arterials as a mix of stopped and running vehicles. It describes the relationship between the vehicles' running speed and the fraction of running vehicles. Two parameters of the model essentially represent 'free flow' travel time and level of interaction among vehicles, respectively, and may be used to evaluate urban roadway networks and urban corridors with partially limited access. These parameters are supposed to be related not only with the characteristics of the roadway but also with behavioral aspects of driver population, e.g., aggressiveness. In this study two-fluid models were estimated for eight arterial corridors in Orlando. The parameters of the two-fluid model, traditionally used to evaluate network operations, were used for the first time to estimate these parameters' correlations with rates of crashes having different types/severity. This is considered the first attempt to use the two-fluid model in a traffic safety application. Significant correlations were found between two-fluid parameters and rear-end and angle crash rates. Rate of severe crashes was also found to be significantly correlated with the model parameter signifying inter-vehicle interactions. While there is need for further analysis, the findings suggest that the two-fluid model parameters may have potential as surrogate measures for traffic safety on urban arterial streets. These models may be useful for flagging corridors with certain safety issues.

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