

Modern approaches to basic traffic flow modeling - the three-phase traffic theory

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Abstract

A review of three-phase traffic theory and associated modeling approaches as well as this theory's applications for freeway traffic control is presented. Motivations for three-phase traffic theory, a history of its development as well as an empirical basis of this theory are discussed. Modeling approaches in the framework of three-phase traffic theory are briefly considered. Results of three-phase traffic theory and their empirical validation are reviewed. A link between three-phase traffic theory and the well-known fundamental diagram approach to traffic flow modelling is considered.

It is stressed that three-phase traffic theory has been introduced by the author as a reaction on a study of a huge number of measured data from many German and Holland freeways made during the author's work (in 1995-1996) at the traffic consulting and software-development firm "Heusch-Boesefeldt" in Germany. From this measured data analysis the author understood that *none* of the well-accepted traffic flow theories and associated modelling approaches (including all earlier works of the authors made in 1993-1995 when he began to work in transportation science) are able to explain traffic breakdown as observed in real traffic flow.