Keynote Session (Wed - 14:00-15:00)

Jean-Patrick LEBACQUE has been student at Ecole Polytechnique and Ecole Nationale des Ponts et Chaussées. He is presently Ingénieur général des Ponts et Chaussées (Engineer general in the French ministry for ecology, sustainable development and energy), director of GRETTIA, a research laboratory devoted to multimodal transportation systems modeling and management, of the COSYS (components and systems) department of IFSTTAR (the French institute of science and technology for transport, development and networks). He is also professor at ENTPE (Ecole nationale des travaux publics de l'état) and EIVP (Ecole des ingénieurs de la ville de Paris), after having taught also at ENPC, UMlV (Université de Marne-la-Vallée) and ENSMP (Ecole nationale supérieure des Mines de Paris). The first half of his career has been devoted mainly to research in conjunction with the industry at IRT and then at the CERMICS laboratory of ENPC (Ecole Nationale des Ponts et Chaussées). He has been working in the field of traffic modeling and transportation since 1993, first at CERMICS and then at INRETS, and has been the author of numerous papers and contributions. His main research interests in the field are macroscopic traffic modeling and its various extensions (LWR, networks, multi-lane, GSOM, bounded acceleration, moving obstacles, variational principles, intersection modeling, discretization techniques, stochastic models). He has served in various scientific committees (TGF, EWGT, Tristan), as associate editor of Transportation Science and in journal editorial boards (Transportation Reseach B and C, NHM Networks and heterogeneous Media).

Abstract

The object of the presentation is the modeling of traffic on very large networks, with emphasis on multimodal vehicular traffic. The various modes which we consider are modes using the road infrastructure: ordinary vehicles, taxis, demand responsive transportation, electric vehicles, autolib, buses. The main approach which will be discussed in the talk is the GSOM family of models. GSOM models combine three elements: conservation of traffic, fundamental diagram and dynamics of driver attributes. It will be shown that GSOM models encompass a large fraction of current macroscopic models, that they are apt to describe many complex flows and situations, and that they can accommodate stochastic perturbations in a natural way. This last property is useful in order to treat question of model identification. The main properties of the GSOM model with respect to network modeling will be described: boundary conditions, intersection modeling, discretization. It will also be shown that the lagrangian version of the GSOM model is compatible with a variational principle which allows easy assimilation of lagrangian data (trajectories). Further modeling issues which will be addressed in the presentation include the combination of GSOM models with models which describe specifically dense networks at a low degree of precision. Such models are useful because it is very difficult to obtain sufficient traffic data for dense networks, even in the context of floating vehicle or GPS data collection. Models for dense networks are typically of a bidimensional nature and the question of interfacing such models with GSOM models will be addressed.