

PHASE TRANSITION MODELS FOR VEHICULAR TRAFFIC

Massimiliano Rosini

Maria Curie-Skłodowska University, Lublin, Poland

In this talk I present an existence result obtained in [1] for a two-phase transition (PT) model for vehicular traffic. Such PT model is obtained by coupling the first order Lighthill, Whitham [2] and Richards [3] (LWR) model and the second order Aw, Rascle [4] and Zhang [5] (ARZ) model. More precisely, the PT model describes free and congested phases by means of respectively LWR and ARZ.

I present then an existence result proved in [6] for the constrained version of the PT model. The application of such model is, for instance, the modelling of vehicular traffic along a road with point-like inhomogeneities characterized by limited capacity, such as speed bumps, construction sites, tollbooths, etc.

REFERENCE

- [1] M. Benyahia and M. D. Rosini, “Entropy solutions for a traffic model with phase transitions,” *Nonlinear Anal.*, vol. 141, pp. 167–190, 2016.
- [2] M. Lighthill and G. Whitham, “On kinematic waves. II. A theory of traffic flow on long crowded roads,” in *Royal Society of London. Series A, Mathematical and Physical Sciences*, vol. 229, pp. 317–345, 1955.
- [3] P. I. Richards, “Shock waves on the highway,” *Operations Research*, vol. 4, no. 1, pp. 42–51, 1956.
- [4] A. Aw and M. Rascle, “Resurrection of “Second Order” Models of Traffic Flow,” *SIAM Journal on Applied Mathematics*, vol. 60, no. 3, pp. 916–938, 2000.
- [5] H. Zhang, “A non-equilibrium traffic model devoid of gas-like behavior,” *Transportation Research Part B: Methodological*, vol. 36, no. 3, pp. 275–290, 2002.
- [6] M. Benyahia, C. Donadello, N. Dymski, and M. D. Rosini, “An existence result for a constrained two-phase transition model with metastable phase for vehicular traffic,” *NoDEA Nonlinear Differential Equations Appl.*, vol. 25, no. 5, pp. Art. 48, 42, 2018.