## Kinetic models for vehicular traffic and related macroscopic models

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In this second course on mathematical traffic flow an introduction to traffic flow models based on kinetic transport equations and their relation to macroscopic models is given. We will discuss the following points.

- 1. The derivation of kinetic traffic flow equations from classical Boltzmann type arguments for the interaction between the vehicles. (Spatially) homogeneous and inhomogeneous models. A discussion of problems of the approach and possible solutions.
- 2. Derivation and connection to conservation laws. Relation to microscopic traffic models.
- 3. Velocity discretization and discrete velocity models in traffic flow. Connections to hyperbolic relaxation models and macroscopic limits.
- 4. Multiphase traffic theory and stop and go waves.
- 5. Stability analysis of homogeneous and inhomogeneous equations and sources of instability in kinetic traffic equations.
- 6 Further topics: Kinetic controlled hydrodynamics for macroscopic traffic models, Networks and coupling conditions for kinetic traffic equations.