



Karlstad Applied Analysis Seminar (2026)

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Mean-field games for traffic: modeling, numerics, and Nash equilibria

Abstract

Mean-field games provide a powerful framework for describing systems with a very large number of interacting decision-making agents. A natural example is road traffic, where each driver makes individual choices while responding to the overall flow of vehicles around them.

In my talk, I will present the fundamental concepts of mean-field games through a multi-class traffic flow model involving different class of vehicles. Starting from the microscopic description of finitely many interacting agents, I will explain how a macroscopic mean-field game model arises and how the two descriptions are related. I will also discuss some of the numerical challenges associated with solving the resulting mean-field game system and present computational approaches to tackle them. Numerical experiments will illustrate how well the mean-field dynamics reproduce the finite-agent system and how mean-field strategies approximate Nash equilibria when the number of vehicles becomes large.