

"Equilibria and regularity in Mean Field Games with density penalization or constraints"

Filippo Santambrogio
Université Claude Bernard - Lyon 1 - France

Abstract:

In the talk, I will first present a typical Mean Field Game problem, as in the theory introduced by Lasry-Lions and Huang-Caines-Malhamé, concentrating on the case where the game has a variational structure (i.e., the equilibrium can be found by minimizing a global energy) and is purely deterministic (no diffusion, no stochastic control). From the game-theoretical point of view, we look for a Nash equilibrium for a non-atomic congestion game, involving a penalization on the density of the players at each point.

I will explain why regularity questions are natural and useful for rigorously proving that minimizers are equilibria, making the connection with what has been done for the incompressible Euler equation in the Brenier's variational formalism. I will also introduce a variant where the penalization on the density is replaced by a constraint, which lets a price (which is a pressure, in the incompressible fluid language) appears on saturated regions. Then, I will sketch some regularity results which apply to these settings.

The content of the talk mainly comes from joint works with A. Mészáros, P. Cardaliaguet, and H. Lavenant.