Séminaire de Probabilités et Statistique

Mardi 14 mai à 14h00

Laboratoire Dieudonné

Salle de réunion Fizeau - LJAD

Alekos Cecchin

LJAD, Université de Nice

On the convergence problem in mean field games : a two state model without uniqueness

Joint work with Paolo Dai Pra, Markus Fischer, and Guglielmo Pelino.

Mean field games were introduced as limit model for symmetric N-player games, as the number of players tends to infinity. We consider N-player and mean field games in continuous time over a finite horizon, where the position of each agent belongs to $\{-1, 1\}$. If there is uniqueness of mean field game solutions, e.g. under monotonicity assumptions, then the so-called master equation possesses a smooth solution which can be used to rigorously prove convergence of the value functions and of the feedback Nash equilibria of the N-player game, as well as a propagation of chaos property for the associated optimal trajectories. We study here an example with anti-monotonous costs, and show that the mean field game has exactly three solutions. We prove that the value functions converge to the entropy solution of the master equation, which in this case can be written as a scalar conservation law in one space dimension, and that the optimal trajectories admit a limit : they select one mean field game soution, so there is propagation of chaos. Moreover, viewing the mean field game system as the necessary conditions for optimality of a deterministic control problem, we show that the N-player game selects the optimizer of this problem. Based on joint works with