Applied Mathematics

CRM-McGill Applied Mathematics Seminar

Feb.5, 2006, 2:35 pm Monday
At McGill, Burnside Hall 1205

"Nash Certainty Equivalence in Large Population Stochastic Dynamic Games: Connections with the Physics of Interacting Particle Systems"

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McGill

Coffee and refreshments will be served after the seminar

Abstract:

We consider large population dynamic games where the agents evolve according to their interacting non-uniform dynamics and are coupled by their individual cost functions. Starting with linear dynamics and quadratic costs, a state aggregation technique is employed to obtain a set of decentralized control laws for the individuals which ensures closed-loop stability and a so-called $\epsilon-$Nash equilibrium property. In order to handle large populations of nonlinear systems (i.e. agents), the Nash Certainty Equivalence (NCE) methodology generalizes via an extension of the theory of uncontrolled interacting particle systems developed by McKean and Vlasov. The general NCE theory treats the controlled version of the particle system model in which each generic individual at a microscopic level interacts with the ensemble of other individuals of which it is itself, in a statistical sense, a representative. This general NCE theory entails the development of a Hamilton-Jacobi-Bellman equation whose coefficients depend upon the probability distribution of the population of agents.

This is joint work with Minyi Huang, The Australian National University and Roland P. Malhamé, École Polytechnique de Montréal.