

Boltzmann-type control for consensus dynamics

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In this talk I will present some recent developments on a class of numerical methods for the optimal control of multi-agent systems. Due to the high-dimensionality and the nonlinearities of this type of problems, standard techniques usually fail or they are completely inefficient. In order to reduce the complexity of the problem, I will propose a general framework based on the approximation of the constrained microscopic dynamics through the control of a Boltzmann-type equation, showing that under suitable scaling this is equivalent to the mean-field description of the original problem.

A class of fast algorithms, based on the simulation of the binary interactions of the Boltzmann dynamics, is derived, and its consistency with respect to the mean-field control problem is shown. Several numerical examples will show the effectiveness of the proposed strategies in the context of opinion formation and flocking dynamics.