

THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SPECIAL COLLOQUIUM

Simple and Efficient Iterative Strategies for Mean-Field Games

By

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Abstract

The mean-field game (MFG) studies the Nash Equilibrium of a non-cooperative game involving a continuum of players with many applications in economics, epidemics, crowd motion, data science, etc. In a MFG, each player seeks to optimize a strategy that minimizes their individual cost, in response to a given state distribution of the entire player population. And the individual best strategies collectively shape a new state distribution of the player population. The equilibrium of a MFG is the fixed point of this interaction. However, simple fixed-point iterations do not always guarantee convergence. Fictitious play is a very simple iterative algorithm that leverages a best-response mapping combined with a weighted average of the best response and earlier responses.

In this talk, I will first present a simple and unified convergence analysis with an explicit convergence rate for the fictitious play algorithm in MFGs of general types, especially non-potential MFGs. Based on this analysis, we propose several numerical strategies to accelerate a fictitious play. Then I will present a simple and effective iterative strategy, Equilibrium Correction Iteration (ECI), to solve a class of inverse MFG problems where simple Nash equilibrium state measurements can be used to infer the unknown ambient potential, such as obstacles.

Date : 9 July 2025 (Wednesday) Time : 3:00p.m. – 4:00p.m. Venue : Room 6602 (near Lift 31/32)

All Are Welcome!