

Optimization algorithms and differential equations: theory and insights

Konstantinos Zygalakis, University of Edinburgh

The ability of calculating the minimum (maximum) of a function lies in the heart of many applied mathematics applications. In this talk, we will connect such optimization problems to the large time behaviour of solutions to differential equations. In addition, using a control theoretical formulation of these equation, we will utilise a set of linear matrix inequalities (applicable in the case of strongly convex potentials) to establish a framework that allow us to deduce their long-time properties as well as deducing the long time properties of their numerical discretisations. using this framework, we give an alternative explanation for the good properties of Nesterov method for strongly convex functions, as well as highlight the reasons behind the failure of the heavy ball method