The infinity-Laplacian: from AMLEs to Machine Learning

Damião Araújo - Universidade Federal da Paraíba (Brasil)

araujo@mat.ufpb.br

José Miguel Urbano - KAUST (Arábia Saudita)

miguel.urbano@kaust.edu.sa

Abstract:

The mini-course is an introduction to the analysis of infinity-harmonic functions. We start with a historical tour of the theory, from the pioneering work of Aronsson to recent applications in Machine Learning. We then discuss the Lipschitz extension problem, its solution via MacShane-Whitney extensions and its several drawbacks, leading to the notion of AMLE (Absolutely Minimising Lipschitz Extension). The heart of the course is a rigorous and detailed analysis of the equivalence between being absolutely minimising Lipschitz, enjoying comparison with cones and solving the infinity-Laplace equation in the viscosity sense. An easy proof of the celebrated theorem of Jensen on the uniqueness of infinity harmonic functions, due to Armstrong and Smart, and a digression on the state of the art concerning their regularity conclude the set of lectures.

Prerequisites:

The minicourse is intended for graduate students and researchers interested in Analysis and PDEs. The prerequisites are a basic knowledge of Measure Theory and Functional Analysis.