POLITECNICO DI TORINO

DISMA Dipartimento di Scienze Matematiche G. L. Lagrange

ECCELLENZA 2018 · 2022

Tuesday, May 28, 2019 at 10:00
Politecnico di Torino, DISMA, Aula Buzano (third floor)

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Assistant Professor at the Courant Institute of Mathematical Sciences

Solutions to two conjectures in branched transport: stability and regularity of optimal paths

Prof. Luca Lussardi introduces the seminar

Abstract

Models involving branched structures are employed to describe several supply-demand systems such as the structure of the nerves of a leaf, the system of roots of a tree and the nervous or cardiovascular systems. The transportation cost in these models is proportional to a concave power $\alpha \in (0,1)$ of the intensity of the flow. In this seminar, Dr De Rosa focuses on the stability of the optimal transports, for variations of the source and target measures. The stability was known for α bigger than a critical threshold, but in this seminar, stability is proved for every exponent $\alpha \in (0,1)$, and a counterexample for $\alpha = 0$ will be provided. Thus a conjecture of the book "Optimal transportation networks", by Bernot, Caselles and Morel, is completely solved. Moreover, the robustness of the proof allows getting the stability for more general lower semicontinuous cost functionals. Furthermore, Dr De Rosa will prove the stability for the mailing problem, which was completely open in the literature, solving another conjecture of the book mentioned above. This latter result is used to show the regularity of the optimal networks. (Joint works with Maria Colombo and Andrea Marchese)

Biography

Dr Antonio De Rosa is an Assistant Professor at the Courant Institute of Mathematical Sciences (NYU) since 2017. He got a Master degree in Mathematics at the University Federico II of Naples (2014) and a Master degree in PDEs and Scientific Programming at the University Paris-Sud (2014), where he was awarded the Excellence Fellowship of the "Fondation mathematique Jacques Hadamard" (10.000 Eur). Then he moved to the University of Zurich, where he got a PhD in Geometric measure theory and PDEs (2017) under the supervision of Camillo De Lellis and Guido De Philippis. He was awarded a Distinction for his PhD thesis (conferred to the top five per cent of the candidates). Moreover, he has been awarded the GRC Grant from the University of Zurich for an international conference organization. His domains of expertise are Geometric Measure Theory, PDEs, Geometric Analysis, Calculus of Variations and Optimal Transport. Antonio is the author of 13 research papers and he has been a speaker at ten international conferences. Moreover, he has delivered individual talks at more than 40 universities. Furthermore, he organized an "American Mathematical Society Sectional Meeting" at the University of Hawaii Manoa (March 22-24, 2019) and an "American Institute of Mathematical Sciences Special Session" in Atlanta (June 5-9, 2020).