A midday Workshop on Variational Analysis

CMM, Av. Blanco Encalada 2120 Piso 7, Santiago. Wednesday, October 13, 2013

Program and abstracts

15:30--16:15: **Prof. Ivar Ekeland**, CEREMADE, U. de Paris 6, France "*Optimal shape of an open mining pit*"

16:15--16:30: **A coffee break**

16:30--17:15: **Dra. Yboon Garcia**, CIUP-IMCA, Perú "*On extensions of Kenderov's single-valuedness result for monotone maps*"

17:15—18:00: **Dr. Dmitriy Drusvyatskiy**, University of Waterloo, Canada "*Slope and Geometry in Variational Mathematics*"

Prof. Ivar Ekeland, *Optimal shape of an open mining pit*

Given a vein of ore in the ground, which is to be extracted by open-pit mining, what is the shape which will maximize profit? This problem is often treated by discretization, but we present a new way to handle directly the continuous case. We set it up as an optimal transportation problem, which we solve using Kantorovitch duality. This is joint work with Maurice Queyranne

Dra. Yboon Garcia, *On extensions of Kenderov's single-valuedness result for monotone maps*

One of the most famous single-valuedness results for set-valued maps is due to Kenderov and states that a monotone set-valued operator is single-valued at any point where it is lower semi-continuous. This has been extended in Christensen-Kenderov to monotone maps satisfying a so-called property. Our aim in this work is twofold: First, to prove that the property assumption can be weakened; second to emphasize that these classical single-valuedness results for monotone operators can be obtained, in very simple way, as direct consequences of counterpart results proved for quasimonotone operators in terms of single-directionality

Dr. Dmitriy Drusvyatskiy, *Slope and Geometry in Variational Mathematics*

Various notions of the "slope" of a real-valued function pervade optimization and variational mathematics more broadly. In the semi-algebraic setting—an appealing model for concrete variational problems — the slope is particularly well-behaved. This talk sketches a variety of surprising applications, illustrating the unifying power of slope. High-lights include error bounds for level sets, the existence and regularity of steepest descent curves in complete metric spaces (following Ambrosio et al.), transversality and the con-ver-gence of von Neumann's alternating projection algorithm, and the geometry underlying nonlinear programming active-set algorithms. This talk will be self-contained, requiring no familiarity with variational analysis, optimization theory, or semi-algebraic geometry. This is a joint work with A. Daniilidis, A.D. Ioffe, M. Larsson, and A.S. Lewis.