First Joint Meeting Brazil Italy of Mathematics
Special Session: Optimal Control

Rio de Janeiro, August 29 - September 02, 2016

Title: First and Second Order Necessary Conditions in Stochastic Optimal Control

Authors: Hélène Frankowska, Haisen Zhang, Xu Zhang

Abstract: This talk concerns the first and second order necessary optimality conditions for stochastic optimal control problems of the Bolza type. The control system is governed by a stochastic differential equation whose drift and diffusion terms are control dependent and the set of controls may be nonconvex. The optimal controls under consideration are those providing the weak local minima. The derived first order necessary condition involves one adjoint equation and a pointwise variational inequality. They are very similar to the known necessary conditions of the deterministic optimal control theory. The second order necessary condition is stated in the integral form and involves two adjoint equations. For sufficiently regular singular weak local minimizers this second order integral inequality implies a pointwise condition. To obtain these results we use the classical variational approach reinforced by the set-valued analysis and the Malliavin calculus.