

# First Joint Meeting Brazil Italy of Mathematics

## Special Session: Optimal Control

Rio de Janeiro, August 29 - September 02, 2016

**Title:** Generalized characteristics, singularities, and Lax-Oleinik operators

**Authors:** Piermarco CANNARSA and Wei CHENG

**Abstract:** Viscosity solutions of Hamilton-Jacobi-Bellman equations are nonsmooth functions which may fail to be differentiable on “small” sets. Such singularities, which play an important role for the underlying optimal control problem, have been analyzed from various viewpoints. Their dynamics can be described by generalized characteristics, which are forward solutions of the characteristic system in Filippov’s sense. In this talk, for stationary Tonelli Hamiltonians we develop an intrinsic proof of the existence of generalized characteristics using sup-convolutions for the so-called fundamental solution. This approach, together with local convexity estimates for the fundamental solution, leads to new results such as the global propagation of singularities.