A. Arutyunov (arutun@orc.ru), Peoples Friendship University of Russia, Moscow 117198, Mikluka-Maklai, 6, Russia, and **F. Lobo Pereira*** (flp@fe.up.pt), Faculdade de Engenharia da Universidade do Porto, R. Dr. Roberto Frias, 4200-465 Porto, Portugal, *Second order necessary conditions for optimal impulsive control problems*

In this presentation, we address first and second order necessary conditions of optimality for an impulsive control problem. This is not the most general formulation, but it clearly illustrates one of the main features of these results: no *a priori* normality assumptions are required, and the assumptions are informative for abnormal control processes as well.

The method used in the proof of these conditions differs substantially from all others so far adopted in the impulsive control literature. The proof consists of regarding the optimal control problem as an instance of a general abstract optimization problem with equality and inequality type constraints and constraints given by convex cone, for which an extremal principle is proved for an abstract minimization problem. An outline of the proof will be sketched, and simple examples for both normal and abnormal problems will be given.