

# Sufficient optimality conditions for infinity dimensional optimization problems

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## Abstract

In the first part of the report we consider the following optimization problem

$$f_0(x) \rightarrow \min, F(x) = 0, f_1(x) \leq 0, \dots, f_k(x) \leq 0.$$

Here  $X, Y$  are normed spaces and all mappings are smooth in some special sense. Second order sufficient conditions for a local minimum at arbitrary point  $x_0$  are developed. These conditions are formulated in terms of the Lagrangian formalism, and neither of the assumptions that i)  $X, Y$  are complete and ii) the linear subspace *im*  $F'(x_0)$  is closed, is a priori assumed.

In the second part of the report we consider the classical optimal control problem on a fixed time segment. For this problem we introduce a special type of minima, which corresponds to  $L_0$  metric in the space of measurable functions. We prove that Pontryagin maximum principle and a strengthened maximum condition for Hamilton-Pontryagin function make together sufficient conditions for local minimum mentioned above.