Title: Hierarchical Problems with Evolutionary Equilibrium Constraints

Author: Lukáš Adam

Supervisor: Prof. Jiří Outrata

Abstract: In the presented thesis, we are interested in hierarchical models with evolutionary equilibrium constraints. Such models arise naturally when a time–dependent problem is to be controlled or if parameters in such a model are to be identified. We intend to discretize the problem and solve it on the basis of the so–called implicit programming approach. This technique requires knowledge of a generalized derivative of the solution mapping which assigns the state variable to the control variable/parameter. The computation of this generalized derivative amounts equivalently to the computation of (limiting) normal cone to the graph of the solution mapping.

In the first part we summarize known techniques for computation of the normal cone to the set which can be represented as a finite union of convex polyhedra. Then we propose a new approach based on the so–called normally admissible stratification and simplify the obtained formulas for the case of time–dependent problems. The theoretical results are then applied first to deriving a criterion for the sensitivity analysis of the solution mapping and then to the solution of two practically motivated problems. The first one concerns optimal control of a queue at a service point while the other one deals with parameter identification in a delamination model.