Regularity and Approximations in Optimal Control
(TU Wien, Supervisor: V. Veliov)

A possible scenario for the research within the PhD study may look as follows. The PhD student will have to become acquainted with several aspects of the modern theory of regularity of (set-valued) maps and methods of variational analysis. Then second-order sufficient optimality conditions for optimal control of parabolic partial differential equations (PDEs) will be investigated, and conditions for regularity of the associated optimality system will be obtained. The focus will be on problems with objective functionals that are not strongly convex, possibly even non-convex, in particular, problems of sparse control. Based on that, convergence of numerical methods will be investigated, and new numerical schemes for problems with discontinuous (switching) controls will be developed. The results will be applied in the framework of the so-called model predictive control method, which is a main mathematical tool for process control in industry. Although the focus of the research will be on parabolic controlled PDEs, results of the same spirit for controlled ordinary differential systems and more general differential variational inequalities will also be targeted.

Substantial variations from the above scenario are possible, depending on the personal preferences and skills of the student.

Preliminary knowledge in optimization, functional analysis, and differential equations (including numerical methods) is an advantage. Applications have to be sent online to: margit.kainerstorfer@tuwien.ac.at; see the job offer. The deadline for application is **March 5, 2020**.