On optimal control problems with quasilinear parabolic PDE and additional inequality constraints

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In this talk, we give an overview about optimal control problems governed by quasilinear parabolic PDEs, subject to additional inequality constraints ranging from plain control bounds to a variety of constraints on the state and its gradient.

We will first provide an overview about existence and regularity results for the state equation and associated challenges. Once a well-defined control-to-state mapping is established, we focus on proving existence of solutions and first order necessary optimality conditions. Since the nonlinear solution operator makes the overall control problem nonconvex, we will also be concerned with second order sufficient optimality conditions for particular cases. Throughout the talk, we will frequently compare the results and challenges to problems with e.g. semilinear state equation.

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