Neumann boundary control of semilinear elliptic equations: finite element discretization and error estimates

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This talk is concerned with the finite element discretization and error analysis of Neumann boundary control problems governed by semilinear elliptic partial differential equations in polygonal domains where the control has to fulfil pointwise inequality constraints. In order to solve this problem the state and the adjoint state are discretized by linear finite elements whereas the control is discretized by piecewise constant ansatz functions. In a postprocessing step approximations of the continuous optimal control are constructed which possess superconvergence properties. The negative influence of corner singularities on the approximation rates is compensated by mesh grading techniques. Imposing second order sufficient optimality conditions for the continuous optimal control, error estimates for the constructed control related to the continuous one is proven. Finally, the quality of the approximations is demonstrated by a numerical example.

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