Parabolic optimal control problems with pointwise controls

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We consider a parabolic optimal control problem with a pointwise control in space, but variable in time, in two or three space dimensions. To approximate the problem numerically we use the standard continuous piecewise linear approximation in space and the first order discontinuous Galerkin method in time. Despite low regularity of the state equation, we show almost optimal h^2+k convergence rate in 2D and $h+\sqrt{k}$ in 3D for the control in L^2 norm. I will explain the key regularity estimate and new a priori fully discrete global and local error estimates in $L^2([0,T]; L^\infty(\Omega))$ norms for parabolic problems, that are essential in our analysis.

This work is a joint project with Prof. Vexler.