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Sensitivity and turnpike results for the optimal control of PDEs and their use for model predictive control

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Abstract: Model predictive control (MPC) is a popular control method, in which a feedback control is computed from the successive numerical solution of optimal control problems. For large scale systems including numerically discretized PDEs this method is computationally challenging, because the optimal control problems must be solved within one sampling period, i.e., in a potentially relatively short time.
A particular feature of MPC is that typically the optimal control problems are solved on overlapping horizons, implying that only a small portion of the computed optimal control function is actually used. This suggests that an adapted discretization in time and/or space may offer a large benefit for MPC of PDEs. In this talk we first explain the theoretical justification of this approach based on novel sensitivity and turnpike results for the optimal control of general evolution equations. Then the efficiency of the proposed method is illustrated by numerical experiments.
The talk is based on joint work with Manuel Schaller and Anton Schiela (both University of Bayreuth).

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