**Adaptive construction concepts for the prediction horizon in MPC of PDE systems**

The core of the Model Predictive Control (MPC) method in every step of the algorithm consists in solving a time-dependent optimization problem on the prediction horizon of the MPC algorithm, and then to apply a portion of the optimal control over the application horizon to obtain the new state. To solve this problem efficiently, we propose a time-adaptive residual a-posteriori error control concept based on the optimality system of this optimal control problem. This approach not only delivers a tailored time discretization of the the prediction horizon, but also suggests a tailored length of the application horizon for the current MPC step. We apply this concept for systems governed by linear parabolic PDEs and present several numerical examples which demonstrate the performance and the robustness of our adaptive MPC control concept.

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