## Bernoullis Tafelrunde

GRADUATE STUDENT SEMINAR

Monday, 10 October 2022, 12:15-13:00 Seminarraum 05.002, Spiegelgasse 5

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## Sparse grid approximation of the Riccati operator

## Abstract

We consider the sparse grid approximation of the Riccati operator P arising from closed loop parabolic control problems. In particular, we concentrate on the linear quadratic regulator (LQR) problems, i.e. we are looking for an optimal control  $u_{opt}$ in the linear state feedback form  $u_{opt}(t, \cdot) = Px(t, \cdot)$ , where  $x(t, \cdot)$  is the solution of the controlled partial differential equation (PDE) for a time point t. Under sufficient regularity assumptions, the Riccati operator P fulfills the algebraic Riccati equation (ARE)

$$AP + PA - PBB^*P + Q = 0,$$

where A, B, and Q are linear operators associated to the LQR problem. We approximate the operator P by using a sparse grid space, which considerably reduces the cost to solve the Riccati IDE. Numerical results are given to validate the approach.