

Can we compute the matrix inertia of Kronecker-structured saddlepoint matrices?

Nonlinear model predictive control schemes solving the step-wise local optimization problems via, e.g. `ipopt` lead to the necessity to solve large KKT systems in each step of the optimizer. The KKT system itself is a saddle point matrix and, due to the outer MPC approach, ideally has Kronecker structure.

`Ipopt` uses the matrix inertia of the KKT system to accelerate computations. Classic LU-based solvers use the matrix factorization to derive the inertia as a side product. Due to the Kronecker structure, we want to use structured linear algebra solvers tackling Sylvester-type equations rather than the LU of the large Kronecker matrix. For optimal performance of `ipopt`, this, however, requires a way to compute or estimate the inertia of the Kronecker matrix from the small block data.

Primary author: Dr SAAK, Jens (Max Planck Institute for Dynamics of Complex Technical Systems)

Co-author: BREMER, Jens (Max Planck Institute for Dynamics of Complex Technical Systems)

Presenter: Dr SAAK, Jens (Max Planck Institute for Dynamics of Complex Technical Systems)

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