Session 2: Modeling and Control
17:00 – 17:20, 14th, July

Optimal Experiment Design for Nonlinear Dynamic (Bio)chemical Systems using Sequential Semidefinite Programming

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Optimal experiment design (OED) for parameter estimation in nonlinear dynamic (bio)chemical processes is discussed in the presentation. To reduce the uncertainty in an experiment, a suitable measure of the Fisher information matrix or variance-covariance matrix has to be optimized. In this work, novel optimization algorithms based on sequential semidefinite programming (SDP) are proposed. The sequential SDP approach has specific advantages over sequential quadratic programming in the context of OED. First of all, it guarantees on a matrix level a decrease of the uncertainty in the parameter estimation procedure by introducing a linear matrix inequality. Second, it allows an easy formulation of E-optimal designs in a direct optimal control optimization scheme. Finally, a third advantage of SDP is that problems involving the inverse of a matrix can be easily reformulated.