pyLSCOLDAE - A Least-Squares Collocation Solver for DAEs in Python

Caren Tischendorf

joint work with Lorenz Biegler and Henning Sauter

We present a least squares collocation solver for solving differential-algebraic equations in python. Recently, it has been shown that least-squares collocation methods for DAEs show a robust behavior, in particular for DAEs with higher index [1-3]. When standard methods for DAEs fail, least-squares collocation methods may lead to a satisfactory numerical solution. In contrast to classical collocation methods, more collocation points than degrees of freedom for the collocation polynomials are used. Our python solver is applicable to initial as well as boundary value problems. We discuss its behavior for different polynomial representations of the solutions and several optimization methods used for computing the least squares solution of the overdetermined collocation equations. Finally, we present simulation results for the simulation and optimal control of chemical reactors [4] and gas transport networks [5].

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