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Unser Zeichen:
KWT 9

Master's Project
Development and Implementation of Sequential Optimization in MOSAICmodeling's User-Defined Language Specification

The core strength of d|b|t|a's modeling, simulation, and optimization environment "MOSAICmodeling" is the ability to generate programming code for the solution of mathematical models. For this purpose, MOSAICmodeling has so called "Language Specificators", which hold the description of how mathematical models should be translated into code. In addition, MOSAICmodeling recently added support to allow users to set up these specifications themselves by the means of "User-Defined Language Specifications" (UDLS).

So far, the UDLS allows for the set-up of exports for simulation problems (nonlinear equation systems, ordinary differential equation systems, and differential algebraic equation systems) as well as simultaneous optimization problems (everything up to mixed-integer nonlinear programming problems). However, major advancements could be made in case the UDLS also supported the generation of sequential optimization code, which is frequently used for the optimization of boundary or initial value problems.

In the scope of this Master's project, the UDLS shall be extended to fully support the generation of sequential optimization problems and an according case study for the optimization of a batch reactor shall be set up, exported and solved. To this end, the following additional features need to be implemented in MOSAICmodeling:

- New generation blocks/functions inside the UDLS to form subsets of variables (e.g. only integer decision variables, …)
- New options for global variable namings (parameters, decision variables, control variables, …)
- Container combination of various UDLS to generate multiple, heterogeneous files (C++ and python in one batch)
- Introduction of two-sided inequality constraints
- Introduction of inequality constraints for differential systems

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