

Interval based dynamic simulation in chemical process design

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Abstract

Interval analysis is used in dynamic simulations to obtain guaranteed solutions of systems of differential equations which can provide very useful information for optimal process design in Chemical Engineering. Global optimisation methods using interval methods are used to solve problems arising in process design; optimisation problems in process design are largely dominated by nonlinear programming (NLP) and mixed-integer nonlinear programming (MINLP). Information obtained from global optimisation of NLP problems in steady state and dynamic simulations serves as basis to engage this challenging dynamic optimisation problem. In this work we explore several interval methods to tightly enclose the trajectory of systems of IVP and BVP for ODEs and we also explore interval based global optimisation methods to solve simple chemical process design NLP problems. Directions for further work on how to apply the results obtained in dynamic optimisation are given.