

Simultaneous Cyclic Scheduling and Control of a Multiproduct CSTR

Antonio Flores-Tlacuahuac

Department of Chemical Engineering, Universidad Iberoamericana, México DF,
01219, Email: antonio.flores@uia.mx

Ignacio E. Grossmann

Department of Chemical Engineering, Carnegie-Mellon University, Pittsburgh, PA,
15213, Email: grossmann@cmu.edu

Problem Overview

In this work we propose a simultaneous scheduling and control formulation of a continuous stirred tank reactor (CSTR) by explicitly incorporating into the scheduling model process dynamics in the form of differential/algebraic constraints. The formulation takes into account the interactions between scheduling and control and is able to handle nonlinearities embedded into the processing system. The simultaneous scheduling and control problems is cast as a Mixed-Integer Dynamic Optimization (MIDO) problem where the simultaneous approach, based on orthogonal collocation on finite elements, is used to transform it into a Mixed-Integer Nonlinear Programming (MINLP) problem. The proposed simultaneous scheduling and control formulation is tested using a multiproduct continuous stirred tank reactor featuring non-linear behavior. To compare the quality of the solutions, in addition to the best solution found, we also report the second and third best solutions. The problem was solved using both the DICOPT++ and SBB solvers.