fulfill the Compactness Condition. Finally we apply our results to GSIP and conclude that generically the closure of the GSIP feasible set is a Lipschitz manifold (with boundary).

3. Computation of pessimistic solutions to MPECs

Michal Cervinka, Academy of Sciences of the Czech Republic, Institute of Information Theory and Automation, Pod Vodarenskou vezi 4, cervinka@utia.cas.cz / Co-authors: Ctirad Matonoha, Jiri V. Outrata

We present a new numerical method to compute the so-called relaxed pessimistic solutions to mathematical programs with equilibrium constraints (MPECs) where the solution map arising in the equilibrium constraint is generally not single-valued. This method combines two existing codes: BOBYQA for derivative-free optimization under box-constraints, and a variant of the Newton method for solving MPECs from the interactive system UFO. We comment on post-optimization analysis and report on numerical performance on several test problems.

■ TB02

Room H005 - Tuesday 13:30–15:00

Cluster
Optimization in Chemical Engineering
Organizers: I. Grossmann, L.T. Biegler

Dynamic Optimization in Chemical Process Systems

Invited session
Chair: Lorenz T. Biegler

1. Optimizing an intensive energetically integrated cryogenic process

María Soledad Díaz, PLAPIQUI, Universidad Nacional del Sur, Camino La Carrindanga Km 7, Bahía Blanca, Argentina, sdiaz@plapiqui.edu.ar / Co-authors: Juan Ignacio Laiglecia, Mariela Rodriguez, Patricia Hoch

We perform dynamic optimization of an integrated turboexpansion natural gas processing plant. Cryogenic countercurrent heat exchangers with partial condensation have been modeled through dynamic mass, energy and momentum balances in both phases, and thermodynamics with the SRK equation of state. The demethanizer model includes path constraints on CO2 solubility in the upper stages. Dynamic separation vessels and static turboexpander models have been included. The DAE optimization problem has been transformed into a large NLP applying orthogonal collocation over finite elements in time. An IP method with rSQP techniques is used. Optimization variables are top pressure in the demethanizer and a bypass fraction in heat exchangers. The objective is to maximize ethane recovery, when changing to a different operating mode or when step and ramp changes are introduced in feed flowrate. Numerical results provide optimal temporal and spatial profiles and have been compared to plant data, with good agreement.

2. Control vector parameterization and metaheuristics for solving dynamic optimization problems

José Egea, Universidad Politécnica de Cartagena, Paseo Alfonso XIII, 52, 30203, Cartagena, Spain, josea.egea@upct.es / Co-author: José Ricardo Pérez-Correa

Global deterministic methods have been applied to solve dynamic optimization prob-lems, but they can handle limited types of path constraints, require functions differenti-ability and are computationally intensive. Alternatively, a special class of stochastic global optimization methods, called metaheuristics, have been successfully applied to solve a wide range of dynamic optimization problems. In this contribution we present a metaheuristic based on scatter search for the global dynamic optimization of chemical engineering processes using the control vector parameterization (CVP) approach. It is designed to overcome typical difficulties of non-linear dynamic systems optimization such as noise, flat areas, non-smoothness and/or discontinuities. It balances intensifica-tion and diversification by including a local search procedure which can accelerate the convergence to the optimal solutions in some cases. The method has been applied to a set of dynamic optimization benchmarks from the bioprocess engineering area. Its results compared well with those obtained by other optimization methods.

3. A filter trust region method for optimization with reduced order process models

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