

Title: Optimal dynamic operation of chemical processes: Assessment of the last 20 years and current research opportunities

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Abstract.

This talk, intended for the general chemical engineering audience, provides a critical assessment of the research progress in the fields of dynamic operation of chemical processes and process control. The following points are discussed:

- (i) What new intellectual ideas, concepts, and tools have emerged from this research field during the last 20 years.
- (ii) How successfully have the research innovations in problem conceptualization, formulation, and solution been reduced to industrial practice.
- (iii) What application areas have benefited from this research.

Next we present a selection of open problems and research challenges. These research challenges are formulated by enumerating the current industrial needs in different application areas, and identifying common themes that can be addressed by developing new tools in systems theory and engineering. We focus on two topics of interest to our research group:

- (i) How do we distribute tasks in a large-scale application to a collection of agents/controllers so that the overall system achieves near optimal operation.
- (ii) How do we use systems and control tools to address the larger goal of optimizing process economic performance rather than traditional lower level tasks such as setpoint tracking and disturbance rejection.