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Integration of Scheduling and Control Under Stochastic Parametric Uncertainty with Varying Unit Operation Times for Chemical Bat

A new back-off methodology is presented in this work as an approach for solving MIDO formulations arising for the optimal scheduling and control of a flow-shop batch plant under stochastic parametric uncertainty. The proposed algorithm decomposes the MIDO problem into a scheduling problem, a dynamic optimization problem and a unit time operation minimization problem.

These problems are solved iteratively using back-off terms. Parametric uncertainty is modeled using statistical distribution functions and are embedded in the algorithm to ensure dynamic feasibility of the optimal control actions under stochastic realizations in those parameters. To exemplify this methodology, the integration of scheduling and control of a flow-shop batch plant is considered. The results show that unit operation times chosen from optimization are better suited to accommodate stochastic parametric uncertainty while the control actions enforce process operational and product quality constraints at reasonable costs.