# Dynamic optimization of fluid catalytic cracking unit using a nonconvex sensitivity-based general Benders decomposition

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**Abstract**

Fluid catalytic cracking unit, which batch operations are operated in a multirate mode, is a typical continuous process with batch operations. The integration optimization of this problem can be formulated as a hybrid dynamic optimization in terms of parameters and continuous variables. To obtain a high-quality solution, adaptive direct methods are usually required to solve the problem iteratively. However, this paper proposes a novel scheme, which obtains an equivalent or better precision solution with relatively coarse discretization. In detail, by designating the batch operations as complicating variables, an optimal solution and sensitivity information about batch operations are obtained by a nonconvex sensitivity-based general Benders decomposition algorithm. Then the optimal continuous operations are implemented as extra closed-loop controllers by tracking the necessary conditions of optimality, while the optimal batch operations are improved by a line method. The simulation results also analyze the economic effect of different batch operations.

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