

Model Predictive Control of a Cyclic Propylene Steaming Pilot Plant

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The industrial production of catalysts is very demanding as far as the quality of its products is concerned. Due to that reason their proper evaluation is considered to be a necessity. The Cyclic Propylene Steaming Pilot Plant (CPS) is a fluidized bed reactor established at Chemical Process Engineering Research Institute (CPERI) which is used for catalyst deactivation. In order to ensure the creditability of the deactivation results one must have a reliable mathematical model that accurately simulates the systems behavior. The development of the mathematical model and the parameter estimation has been achieved and validated using open-loop dynamic experimental data and advanced statistical methods. Furthermore, the improvement of the overall control scheme has been achieved through a model-based predictive control strategy in order to have a more accurate control of the reactor's temperature, the energy requirements and the final product quality. The optimal sequence of the manipulated variables, which minimize the difference between the desirable and the predicted reactor temperature trajectories, is being calculated with dynamic programming techniques. The model predictive control strategy leads to superior performance in comparison to the previously installed system, consisted of conventional PID controllers.

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