

The online optimization of CATOFIN process

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The CATOFIN process is a propane dehydrogenation process for production of propylene. It is composed of multiple adiabatic fixed-bed reactors where dehydrogenation and regeneration (decoking) are performed alternatively over roughly ten minutes of period for each operation. In the industrial CATOFIN process, the main concern is to maintain the reactor operation at the optimum condition overcoming the gradual catalyst deactivation. In this research, an online optimization system that includes online optimizer, real-time identification, and repetitive controller has been proposed for the CATOFIN process. The major mission of the optimizer is to calculate the optimum starting bed temperature for the dehydrogenation cycle that maximizes the propylene yield while minimizing the flow rate of the fuel gas during the regeneration period. The controller is designed to perform feedback action during the regeneration cycle and to perform only state estimation during the dehydrogenation cycle. Numerical study has shown that the proposed online optimization system can successfully improve the propylene yield against model uncertainty.