Application of optimal control for direct dimethyl-ether synthesis with a fixed-bed reactor

임유경, 이종민*, 김대식
서울대학교
(jongmin@snu.ac.kr*)

The purpose of this study is to apply a strategy of optimal control for direct dimethyl-ether (DME) synthesis with a fixed-bed reactor. Catalytic reaction in the DME synthesis requires relatively short time to reach its equilibrium. Therefore it becomes less efficient to control the reactor system with a simple feedback control. Optimal control strategy could become a basic step to study the changes in the reaction dynamics and the effect of control weighting factors. The reactor for this synthesis is a 1-D distributed parameter system. The actual system is nonlinear for there are some exponential calculations of states involved in the reaction term. After the linearization of the reaction terms the problem is first approximated through a spatial discretization via finite element method and is then transformed into a temporally discrete system. Dynamic programming with a boundary control input is the method used to study the optimal control. The cost-to-go function is fixed as a quadratic form to create a linear quadratic optimal control problem with the system.