

RBF Modelling and Optimization Control for Semi-Batch Reactors

Authors : Magdi M. Nabi, Ding-Li Yu

Abstract : This paper presents a neural network based model predictive control (MPC) strategy to control a strongly exothermic reaction with complicated nonlinear kinetics given by Chylla-Haase polymerization reactor that requires a very precise temperature control to maintain product uniformity. In the benchmark scenario, the operation of the reactor must be guaranteed under various disturbing influences, e.g., changing ambient temperatures or impurity of the monomer. Such a process usually controlled by conventional cascade control, it provides a robust operation, but often lacks accuracy concerning the required strict temperature tolerances. The predictive control strategy based on the RBF neural model is applied to solve this problem to achieve set-point tracking of the reactor temperature against disturbances. The result shows that the RBF based model predictive control gives reliable result in the presence of some disturbances and keeps the reactor temperature within a tight tolerance range around the desired reaction temperature.

Keywords : Chylla-Haase reactor, RBF neural network modelling, model predictive control, semi-batch reactors

Conference Title : ICCET 2014 : International Conference on Control Engineering and Technology

Conference Location : London, United Kingdom

Conference Dates : July 27-28, 2014