Comparison of Conventional Control and Robust Control on Double-Pipe Heat Exchanger

Authors : Hanan Rizk

Abstract : A heat exchanger is a device used to mix liquids having different temperatures. In this case, the temperature control becomes a critical objective. This research work presents the temperature control of the double-pipe heat exchanger (multi-input multi-output (MIMO) system), which is modeled as first-order coupled hyperbolic partial differential equations (PDEs), using conventional and advanced control techniques and develops appropriate robust control strategy to meet stability requirements and performance objectives. We designed a PID controller and H-infinity controller for a heat exchanger (HE) system. Frequency characteristics of sensitivity functions and open-loop and closed-loop time responses are simulated using MATLAB software, and the stability of the system is analyzed using Kalman's test. The simulation results have demonstrated that the H-infinity controller is more efficient than PID in terms of robustness and performance.
Keywords : heat exchanger, multi-input multi-output system, MATLAB simulation, partial differential equations, PID controller, robust control