Abstract

Nowadays, there are a lot of different control methodologies that could be used on industrial processes. Some of these methodologies have a complex design and also demands an extra engineering effort to design the controller with a superior performance. Some other controllers may not lead to a desirable performance although they are too easy to design. Midway between the simplest and the most complex controller designs, there are an intermediate solutions based on optimal control theory, that present a relative simplicity in design combined with a superior performance. The contribution of this work is to apply the LQR control (Linear Quadratic Regulator) and the H-Infinity control on a Heat Exchanger Network (HEN) with bypasses, presenting the simulations and the experimental results. An experimental validation of the shell and tube heat exchanger mathematical model was successfully developed based on a procedure proposed. The experimental results were obtained with an HEN assembled on the Chemical Engineering Laboratory located at Centro Universitario da FEI. The instrumentation was adequately performed and the signals were interconnected on PC computer by using a data acquisition card. The simulation and the experimental results with the LQR and the H-Infinity control demanded 200s. to achieve a new steady state when disturbances or set point variation were applied on the HEN. Compared with the HEN setting time (600s.), the controllers demonstrated reasonable results to perform a disturbance rejection and a set point variation.

Keywords: *Heat Exchanger, Heat Exchanger Network, LQR Control, Multivariable Control*