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DYNAMIC SIMULATION OF HEAT EXCHANGER NETWORKS: CONTROLLABILITY AND RESILIENCY ANALYSIS

Mauro A. S. S. Ravagnani[*,§], Carmen I. De Leon Herrera[*], Camila B. Miranda[*], Leandro V. Pavão[*] and Cid M. G. Andrade [*]
[*]Chemical Engineering Department, State University of Maringá
[§]Correspondence author. Fax: +55 44 30114745 Email: massravagnani@uem.br

ABSTRACT

Considering its importance in industrial processes, the control of Heat Exchanger Networks (HEN) is a subject that has ben studied in the latest years for several researchers as an important feature in increasing processes efficiency. Steady-state control and resiliency analysis often provides a good assessment of the controllability and resiliency of HEN but dynamic analysis should be considered, especially when the steady-state analysis is inconclusive. In the present paper, a HEN is studied using Aspen HYSYS® and some of the HEN possible configurations are simulated. Relative Gain Array (RGA), Disturbance Cost (DC) index and thermodynamic methods are used to configure the HEN control system. The controllers tuning is achieved using literature data and the HYSYS® Autotuner. The results of dynamic simulations showed consistency with the steady-state indices. Furthermore, the results proved that more integrated HEN present less controllability. The addition of a bypass stream in the HEN results in better control performance, being the bypass placed in the heat exchanger in which the temperature of the process output stream is the controlled variable.