

Pattarasak Sattarattanakul 2009: Design of control structure for mass exchanger networks. Master of Engineering (Chemical Engineering), Major Field: Chemical Engineering, Department of Chemical Engineering. Thesis Advisor: Associate Professor Thongchai Srinophakun, Ph.D. 94 pages.

This thesis aims to present a design of optimal operation for mass exchanger networks under the minimum total annual cost (TAC) and the optimal split-range control. The proposed strategy is consisted of four main steps. First, mass exchanger networks is formulated as a mixed integer nonlinear programming (MINLP) with the minimized total annual cost. Second, performing flexibility test to ensure the network is feasible for a large number of uncertain parameters that are generated randomly within the operating ranges. Next, the parametric programming is used to find the active constraint regions and the integer linear programming (ILP) is used to formulate an optimal split-range control structure. Finally, the optimal operations of control structure are verified with the proposed dynamic behaviors. The validation of the proposed method of design an optimal split-range control structure for mass exchanger networks is performed by three case studies; El-Halwagi and Manousiouthakis (1989), (1990a) and (1990b). The result of all case study are not guarantee the global optimization but all cases are checked through flexibility testing, dynamics testing and they demonstrate that the obtained control structures can keep all target mass fractions at the desired values even under the saturation of some manipulated variables when system of MENs are disturbed by reducing 10, 20 and 30% mass fraction of rich streams and lean streams.

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Thesis Advisor's signature

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