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Series versus Parallel Reboilers in Distillation Columns

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Highlights

- Parallel reboilers provide effective and robust dynamic control.
- A control structure is developed for a divided-wall reactive distillation column with vapor recompression.
- Heat exchanger design should take into account desuperheating and condensing sections.

Abstract

Multiple reboilers are used in distillation columns for several reasons such as implementing heat integration, intermediate reboilers, auxiliary reboilers and vapor recompression. If there is a single source of hot vapor to be used in multiple heat exchangers, the flowsheet can use either a series or parallel arrangements, depending on the temperature levels of the heat sinks. The purpose of this paper is to point out that the series arrangement can present difficult control problems because of interaction between the units. In the parallel configuration, the heat transferred to each sink can be easily divorced from the others. In the series configuration, more complex methods must be used such as bypassing and flooding to adjust heat transfer in individual units.

The controllability of the parallel configuration is demonstrated for a lower-partitioned divided-wall reactive distillation column with vapor recompression.

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