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Simultaneous Optimization of Complex Distillation Systems and Heat Integration Using Pseudo-transient Continuation Models

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Highlights

- A simultaneous optimization framework of complex distillation systems and heat integration is developed.
- Optimization was based on rigorous models in the equation-oriented environment.
- New pseudo-transient continuation models were developed.
- Stage numbers were optimized without introducing integer variables.
- This optimization outperforms optimization based on shortcut models and sequential optimization.

Abstract: For a competitive design of a distillation system, heat integration is currently a necessary component in the chemical industry. In distillation systems with heat integration, the complex interaction among the column design variables and heat integration calls for a systematic optimization method. In this study, the development of a simultaneous optimization framework for distillation systems and heat integration is described. To achieve an accurate and reliable design, rigorous distillation column, heat exchanger and compressor models were used for the optimization. These models were reformulated using a pseudo-transient continuation (PTC) approach to improve their robustness. Because the framework is based on the equation-oriented environment, the automatic or symbolic differentiation is

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