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SCIENTIFIC & RESEARCH PROJECTS

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Project Title:

Optimal Design of Distillation Column Using Three Dimensional Exergy Analysis Curves

Abstract:

This paper presents two main contributions. Firstly, a new exergy graphical method is proposed for optimal design of distillation column with minimum exergy lost. The method is applicable to both grassroots and retrofit cases, respectively. The effect of design and operating parameters of a distillation column on the exergy lost is graphically visualized by three-dimensional exergy analysis curves. The curve shows the correlations between exergy lost, design and operating parameters of a distillation column. This technique can be used as an effective method to reduce the simulation effort to search for the optimum design and operating parameters of a distillation column at minimum exergy lost. Besides, visualization also enhances the engineers' understanding of the column performance. The other contribution is a four-level idealization concept, which is based on three-dimensional graphical exergy analysis curves. The concept defines the effect of transport rate and configuration on exergy loss of distillation column. The effectiveness of the method has been demonstrated on a xylene column, which suggested that an implementation of feed pre-heater yields a significant reduction in exergy lost by up to 15.5%.