Iterative Lumping Approach for representing Lipid Feedstocks in Fatty Acid Distillation Simulation and Optimization

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Abstract

The complexity of lipid feedstocks and the lack of data on physical properties hinder the simulation of oleochemical processing units. In this work, an iterative lumping approach is proposed to define an adequate number of key components such that diversification between lipid feedstocks becomes possible, while keeping the determination of physical properties as required for process modelling manageable. As a case study, the iterative lumping approach is used for simulation and optimization of a fatty acid distillation plant. For predicting vapour-liquid equilibria of fatty acids, the best results were acquired using the property method UNIQ-HOC. Using the iterative lumping approach, 11 key components were selected to represent the feedstock. The process model properly predicts the product composition, yield, purity and heat duty. The most important process parameters are found to be side-reflux-ratio, reboiler-outlet-temperature and heat-duty of the pitch-distiller. For optimization, an increase of the side-reflux-ratio and reboiler-outlet-temperature, is recommended.

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