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Investigation of the operability for four-product dividing wall column with two partition walls

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Abstract

For separating some specific four components mixture into four products, the four-product dividing wall column (FPDWC) with two partition walls can provide the same utility consumption with the extended Petlyuk configuration, although with structure simplicity. However, the reluctance to the implement this kind of four products dividing wall column industrially also consists in the two uncontrollable vapor splits associated with it. The vapor split ratios are set at the design stage and might be not the optimal value for changed feed composition, thus minimum energy consumption could not be ensured. In the present work, sequential iterative optimization approach was initially employed to determine the parameters of cost-effective FPDWC. Then the effect of maintaining the vapor split ratios at their nominal value on the energy penalty was investigated for the FPDWC with two partition walls, in case of feed composition disturbance. The result shows that no more than +2% above the optimal energy requirements could be ensured for 20% feed composition disturbances, which is encouraging for industrial implementation.

Keywords distillation, four-product dividing wall column, vapor split, operability

1 INTRODUCTION