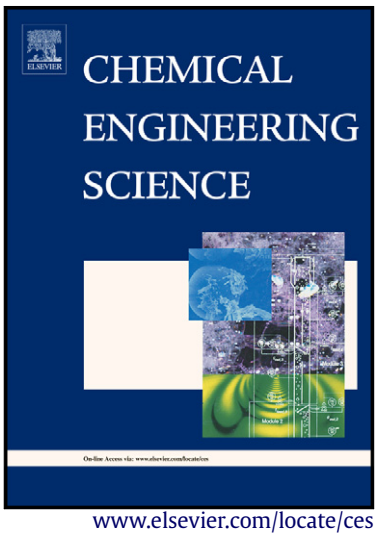

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Multi-column chromatographic process development using simulated moving bed superstructure and simultaneous optimization - model correction framework

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Abstract

In this work, we demonstrate an improved framework for simulated moving bed (SMB) chromatographic process development using a superstructure formulation. Various optimal column configurations and operations are obtained by solving a multi-objective optimization problem representing the superstructure by maximizing feed throughput and minimizing desorbent usage. In order to resolve the model mismatch with experimental data, here we utilize the simultaneous optimization - model correction (SOMC) method in which process optimization is carried out in tandem with model correction using data obtained from experimental evaluations.

The potential of the superstructure-SOMC framework has been demonstrated by separating glucose and fructose using columns packed with a cation exchange resin with water as the mobile phase. The optimal operation modes found using the superstructure included standard SMB, three zone (3Z) operation, intermittent SMB (I-SMB) and a newly found outlet stream swing

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