

### Bi-level optimizing control of an SMB process with nonlinear adsorption isotherms

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A novel bi-level optimizing control scheme has been proposed for SMB processes with nonlinear adsorption isotherms. Product purity regulation is conducted in the lower level using the repetitive model predictive control (RMPC) technique while off-line cyclic steady state optimization is performed in the upper level to determine the optimum feed / desorbent flow rates and switching period. A first principle SMB model with nonlinear isotherms, which is continuously tuned on-line on the basis of the purity measurements, is used for the construction of the controller as well as the optimizer. Numerical study shows that the proposed scheme performs quite satisfactorily. An alternative optimizing control scheme based on an SMB model with linearly approximated isotherms, however, was apt to fail in purity regulation against various disturbances.