# Identification and predictive control of a simulated moving bed process with bi-Langmuir isotherm

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In this study we consider the separation of enantiomers of 1-1'-bi-2-naphtol by using a 3,5-dinitrobenzoyl phenylglycine bonded to a silica gel as stationary phase and a mixture of heptane-hexane(78:22) as the mobile phase in a simulated moving bed process. The adsorption equilibrium is described by the bi-Langmuir isotherm. The first principles model of the SMB unit is considered to be the actual plant. We identify the SMB process by using the subspace identification method. The well-known input/output data-based prediction model is also used to obtain the prediction equation. The average purities of rich component in raffinate and extract, respectively, are selected as the output variables while the flow rate ratios in sections 2 and 3 are selected as the input variables. The identified model based on the subspace identification method shows an excellent prediction performance. The input/output data-based predictive controller based on the identified model is designed and applied to a MIMO control problem for the SMB process. Here we treat two typical control problems of practical interest; one is the disturbance rejection and the other the setpoint tracking. The results of simulation studies clearly demonstrate that the designed controller performs quite satisfactorily in both cases.