Optimization and Economy Evaluation of Moving Bed Adsorption(MBA) for CO_2 capture

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The escalating level of atmospheric CO2 is one of the most pressing environmental problems of our age. We propose a method for carbon capture using adsorption to cope with these concerns partially. The MBA (Moving Bed Adsorption) process is a new technique for capturing CO2 in flue gas emitted from plants. The proposed MBA scheme consists of the adsorption bed and the desorption bed. In the adsorption bed, CO2 adsorption occurs continuously while the adsorbents and fluid move in the opposite directions. In the desorption bed, the adsorbents are regenerated constantly while releasing adsorbed CO2 under low pressure and high temperature. The MBA process can be regarded as a feasible realization of the existing PTSA operation in a continuous process. Economy evaluation incorporating rigorous analysis of the dynamic models is carried out to elucidate the advantages of the MBA process over other conventional techniques such as PSA and absorption processes. In the course of the evaluation, various process modifications including heat integration and two-step desorption process, and optimization of operating conditions are considered.