CO_2 separation from power plant by honeycomb adsorbent

Yosuke Matsukuma
Department of Chemical Engineering, Faculty of Engineering,
Kyushu University

Abstract

Separation of carbon dioxide (CO2) included in the exhaust gas from heat thermal plants is the main cause of global warming. In this presentation, we will introduce the rotary adsorption towers filled with honeycomb-type adsorbent as shown in Fig.1, and conduct the following experiments and simulations. Firstly, we made simulation models in order to precisely estimate the performance of the actual adsorption system. These experimental results were compared with simulation results and showed good agreement. Furthermore, adsorption and desorption of CO2 were successfully simulated at each adsorption, heating, purge, and cooling stage. These results could be helpful guidance for the system optimization of rotary CO2 plants. Secondly, turbulent flow in the honeycomb structure was numerically simulated by the Lattice Boltzmann method to resolve the flow maldistribution phenomena inside the honeycomb structure. A new technique was proposed to automatically design the pore size distributions of the pore plate in front of the honeycomb while keeping the total porosity of the plate constant. In consequence, the technique had an effect on flow uniformization, especially in the case of horizontal inlet of flow with an adequate entrance region.

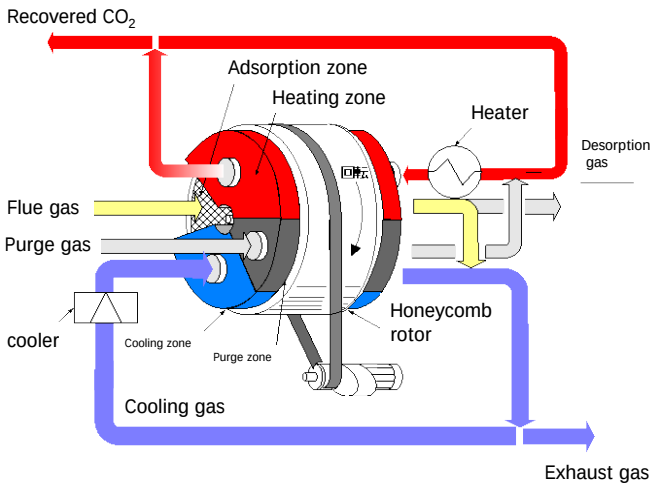

Figure 1