점성 기체-액체-고체 순환유동층에서 열전달 모델

진해룡, 임 호, 이정석, 강 용*, 김상돈[1], 전기원[2]
충남대학교; [1]한국과학기술원; [2]한국화학연구원
(kangyong@cnu.ac.kr*)

A model for heat transfer in the riser of a three-phase (gas-liquid-solid) circulating fluidized bed (0.102 m ID; 2.5 m in height) with viscous liquid media was proposed and used to analyse the heat transfer resistances in the system. The heat transfer resistances were considered based on the two resistance-in-series model. Effects of gas and liquid velocities, particle size, solid circulation rate and viscosity of liquid media on the heat transfer resistance in the region adjacent to the heater surface and that in the bed proper were determined. The heat transfer resistances did not increase significantly in the range of high liquid velocity, comparing with those in the conventional three-phase fluidized bed, confirming that the circulation of fluidized solid particles promoted the heat transfer by decreasing the heat transfer resistances. The resistance in the region adjacent to the heater surface was dominant for determination of heat transfer coefficient in the riser, comparing with the resistance in the bed proper. Both of resistances in the heater surface and in the bed proper decreased with increasing gas velocity, particle size or solid circulation rate, but increased with increasing the viscosity of continuous liquid media, while the former decreased slightly and the latter increased slightly upon increasing the liquid velocity.