점성 기체 -액체 유동층에서 열전달 메커니즘 해석

임대호, 유동준, 강 용*
충남대학교
(kangyong@cnu.ac.kr*)

On the mechanism of heat transfer between the vertical immersed heater and the bulk region of liquid-solid fluidized beds with viscous liquid media was investigated. From the radial temperature profile, it was apparently noted that two resistances are connected in series for the transportation of heat from the heater surface to the bed proper. The unsteady state heat transfer model was employed to analyze the phenomena based on the surface renewal theory. Effects of liquid velocity, particle size and liquid viscosity on the regional as well as overall resistances for heat transfer in the beds were examined. Thermal boundary layer around the heat source, shear stress(τ) acting on the heater surface and effective fluid element velocity(U_f) were predicted and evaluated to analyze the relation between parameters and the regional as well as overall heat transfer resistances. The resistance in the heater zone could be described by adopting the parameters such as the thickness of thermal boundary layer(δ) around the heater surface, τ at the heater surface, contact time between the fluid element and the heater surface and U_f in the bed. The δ was well correlated with liquid viscosity and τ which was obtained from the unsteady state heat transfer model based on the surface renewal theory.