Modeling of Liquid Flow in the Lower Part of Blast Furnace by MPS Method

KON Tatsuya

Institute of Multidisciplinary Research for Advanced Materials,
Tohoku University, Sendai,
Japan

In steelmaking industry, recent environmental problems and the remarkable rise in the price of raw materials have made process optimization and the utilization of low-quality materials necessary. The liquid dripping below the cohesive zone influences gas flow and permeability in the lower part of the blast furnace, and it is closely related to blast furnace productivity and operational stability. Especially, liquid distribution and hold-up in the coke packed bed can be mentioned as important phenomena regarding the liquid dripping. These phenomena are influenced by the structure of the packed bed and the physical properties of the melt. In this research, the influence of the physical properties of the melt on liquid flow distribution and hold-up phenomena was studied by modeling the liquid flow in a packed bed and performing numerical analysis based on Moving Particle Semi-implicit (MPS) method, which is one of the particle methods. The results of the analysis clarified the fact that the viscosity of the liquid is the controlling factor for dynamic hold-up, and solid-liquid wettability is the controlling factor for static hold-up.

Co-authors: **Shungo Natsui, Kikuchi Shin, Shigeru Ueda, Ryo Inoue, Tatsuro Ariyama**