Hydrodynamic behaviors of coal particles in a bench-scale transport gasifier

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The knowledge of hydrodynamics and dispersion of coal particles is essential for reliable design of gasifiers. In this study, the effect of operating conditions on the hydrodynamic behaviors of coal particles is investigated in a bench-scale transport gasifier by means of computational fluid dynamics (CFD) simulation.

A multiphase Eulerian-Eulerian model incorporating the kinetic theory of the granular flow is applied to a three-dimensional CFD modeling to determine the dispersion of coal particles and the particle flow rate in the gasifier. The interaction and momentum exchange between gas and solid phases are calculated using a drag force model. Conservation equations of mass and momentum of each phase are solved by the finite volume method using a commercial CFD code (Fluent, USA). The simulation results are compared to experimental data obtained from the cold-rig tests on the transport gasifier.