International Energy Journal, Volume 12, Issue 2, June 2011

Fluid Dynamic Investigation of an Internal Circulating Fluidized Bed Gasifier by Cold Model

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Abstract

Fluid dynamic behaviour of mineral bed and biomass particles in a steam/oxygen injected gasifier of thermal capacity 1 MW, having two interconnected fluidized chambers and investigated experimentally using a cold model, has been discussed in the present communication. It was ascertained that the architecture of reactor allows, using different fluidizing rates of gasifying agents in the two chambers, to the mineral particles to flow from the less fluidized chamber to the more fluidized one throughout the interconnection window at the bottom of the separating plate, and from the more fluidized chamber to the less one jumping the same plate. In this way the biomass particles despite of their lower density compared to the mineral bed are forced to sink in it, because of the flow direction of the sand particles. The distribution of biomass particles in the bed reactor results more uniform compared to a traditional fluidized bubbling bed reactor, so the elutriation phenomena of mineral and char fine particles is reduced with beneficial effect on the gasification yield, tar production, and gas cleaning.