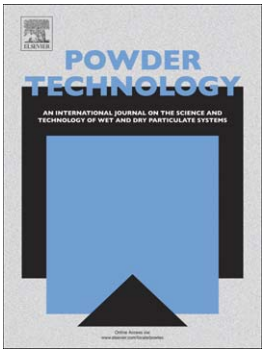


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# The Transition Velocities in a Dual Circulating Fluidized Bed Reactor with Variation of Temperatures

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Abstract

The extra-heavy oil fractions upgrading process, which consisted of a pyrolyzer and a bubbling bed as a combustor/gasifier, was developed. Prior to operating a dual circulating fluidized bed reactor, the transition velocities of flow regime were determined at different temperatures using silica sand particles as the bed material. The transition velocities included minimum fluidization velocity ($U_{mf}$), transition velocity to turbulent fluidization ($U_c$, $U_k$) and transport velocity ($U_{tr}$). The minimum fluidization velocity determined by measuring bed pressured drop with increasing gas velocity was observed to decrease with increasing temperature. Both the transition velocities from bubbling to turbulent fluidized bed behavior determined by measuring bed pressure drop fluctuation and transport velocity from turbulent to fast fluidized bed behavior by emptying time method increased with increasing temperature. Based on the experimental data, correlations are proposed to predict the transition velocities at different temperatures. As the actual dual circulating fluidized bed reactor operation occurs at relatively high temperature, the correlations obtained in this study is directly applicable to the extra-heavy oil fractions upgrading process. Thus, the transition velocities and flow regimes in a dual circulating fluidized bed reactor is determined.

Keywords: Extra-heavy oil fractions upgrading process; Dual circulating fluidized bed reactor; Temperature; Minimum fluidization velocity ($U_{mf}$); Transport velocity ($U_{tr}$).