Hydrodynamic Properties of a Dual Fluidized Bed with Different Temperatures

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The dual fluidized bed biomass gasification is a promising technology to produce synthesis gas (H_2 + CO) having a medium heating value without N_2 dilution. In this study, a dual fluidized bed gasifier (DFBG) was operated in a riser (0.078 m-I.D x 8 m-high) as a combustor and in a bubbling bed as a gasifier (0.2 m-I.D. x 2.1 m-high). The hydrodynamic properties such as minimum fluidizing velocity and transport velocity in a DFBG were determined using silica sand (260 ㎛) as bed materials at different temperature (25-800 ℃). Minimum fluidization velocity decreases from 0.065 m/s to 0.036 m/s with increasing temperature from 25 ℃ to 800 ℃. But the transport velocity, a boundary velocity between the turbulent and fast fluidization flow regimes, increases from 2.55 m/s at 25 ℃ to 4.47 m/s at 600 ℃. These results could be explained by the change of gas viscosity and density as a function of temperature and the correlations are proposed to predict both velocities at different temperature. The effect of operating variables on solid circulation rate was also determined. The obtained data can be utilized to operate a hot DFBG.