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An Experimental Investigation of Hydrodynamics and Heat Transfer Characteristics of Biomass Blending in a Pressurized Circulating Fluidized Bed

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Abstract

In the present investigation, the effects of blending of biomass in sand, superficial velocity and operating pressure on bed hydrodynamics and heat transfer in a pressurized circulating fluidized bed have been studied. Experiments have been conducted at four different percentage blending of biomass such as 2.5%, 7.5%, 15% and 20% in sand and with two different weight composition ratios. All the above studies have been made at two different superficial velocities of 5 and 7 m/s and at three different operating pressures such as 1, 3 and 5 bar. The sand and biomass particle sizes used for the study are 309 µm and 407 µm, respectively. Results show that, with the increase in operating pressure, the bed voidage decreases. The axial heat transfer coefficient increases from the bottom to the top of heat transfer probe with the increase in operating pressure. The radial variation of heat transfer coefficient decreases from the wall to the core of the heat transfer probe. The heat transfer coefficient is also found to be increasing with the increase in % blending of sawdust in sand. The overall uncertainty in calculating heat transfer coefficient is found to be 3.90%.

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