Abstract

Circulating fluidized bed technology (CFB) have attracted a wide range of power producers from all around the world for production of power from different solid fuels including low grade biomass fuels because of its various advantages like in situ capture of NO_x and SO_x and lower maintenance cost. The fluidized bed technology can also be utilized for gasification and combustion applications. The performance of a CFB largely depends on the distributor plate configuration which influences the flow patterns, the bed hydrodynamics and also depends on the operating parameters. The main function of a distributor is to distribute the fluidizing air/gas uniformly across the base of the bed. For the stable operation of any fluidized bed, effective design of a distributor is a must. Non-uniform distribution of air /gas may result in a number of problems such as decrease in efficiency and performance of the bed or agglomeration.

In the present investigation, two different designs of distributor plates (perforated flat plate type and cap type) were used for the experiments in order to study the influence of the distributor plates on the bed hydrodynamics and heat transfer characteristics in the upper splash region of the CFB riser. The experiments were performed at IIT Guwahati on a cold CFB laboratory scale unit. Sand of average particle size of 370 μm and density of 2400 kg/m^3 was used as bed material in the entire set of experiments. The experiments were performed at different bed inventories, superficial velocities and operating pressures. The bed hydrodynamics and wall-to-bed heat transfer coefficient was investigated and compared for both the distributor plates. The results that were obtained in the present investigation shows that the heat transfer coefficient was higher in the case of the cap type distributor than the flat plate type distributor.