Heat transfer in a fluidized bed

Nikhil Chitnavis

Indian Institute of Technology Madras, Chennai, Tamil Nadu, India

Abstract

When fluid passes through the bed of solid particles, depending on the rate with which fluid is passing through it, the bed shows some variation in the position of the particles. Due to this variation, it intensifies the mixing of particles, which consequence in an increase in heat transfer. In the present study, hot air is passed through the cold solid bed particles for two different inlet velocities. Based on the air velocity, the heat transfer through the bed is observed. For lower inlet velocity, the bed particles are not getting affected therefore, the heat transfer through the bed is more like conduction heat transfer through solid bed, However, for high velocity, the bed particles shows bubbling effect which increases the heat transfer in the bed and the temperature vary exponentially with time. In the present study, opensource C++ based platform OpenFOAM is used for running the simulations for which solver used is twoPhaseEulerFOAM. The simulations are performed on openFoam version 7 (OpenFOAM-v7) using a multiphase solver with Euler-Euler modelling. However, the test case is compatible with other openfoam versions (*e.g.* OpenFOAM-v1910 and onwards).