

Abstract

Introduction:

Fluidized bed is an important and widely acceptable process in various range of industries. In fluidized bed there are generally two phase or in some case multiple phases are interacting together. In fluidized bed, solid phase is made to behave like a fluid by passing liquid or gas through it. This process is known as fluidization. Geometrically, fluidized bed is a chamber in which solid particles are present in static condition until gas is passed through it from the bottom of the fluidized bed. Fluidized bed is preferred in industries because it provide high area of contact between two phases, which allows higher heat transfer rates, mass transfer rate and uniform mixing, which results in low temperature gradient. Fluidized beds are highly used in chemical and petroleum industries for conducting gas-solid chemical reaction i.e. gasification of coal, gas-solid catalytic reaction i.e. catalytic cracking of petroleum and also used in bioreactors.

Methodology:

Euler-Euler approach will be used for solving multi-jet fluidized bed. In Euler – Euler method both phases are considered as interpenetrating continua, which provides a good balance between the computational costs and accuracy in the description of the flow. Navier–Stokes equations are solved for both phase and are closed with momentum transfer models along with kinetic friction models for description of granular phase. For simulation purpose OpenFOAM version 4.0 is used and the solver selected is twoPhaseEulerFOAM. And for meshing ICEM CFD is used. Post processing is done on paraView.

Probable Outcome:

Visualization of the bubble and its growth, along with mixing phenomenon in multi-jet fluidized bed.