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A Study on Mesh Size Dependency on Bed Expansion Zone in a Three-Phase Fluidized Bed Reactor

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Abstract : The present study focused on the hydrodynamic study in a three-phase fluidized bed reactor and the influence of important aspects, such as volume fractions (Hold up), velocity magnitude of gas, liquid and solid phases (hydrogen, gasoil, and gamma alumina), interactions of phases, through of drag models with the k-epsilon turbulence model. For this purpose was employed a Euler-Euler model and also considers the system is constituted of three phases, gaseous, liquid and solid, characterized by its physical and thermal properties, the transport processes that are developed within the transient regime. The proposed model of the three-phase fluidized bed reactor was solved numerically using the ANSYS-Fluent software with different mesh refinements on bed expansion zone in order to observe the influence of the hydrodynamic parameters and convergence criteria. With this model and the numerical simulations obtained for its resolution, it was possible to predict the results of the volume fractions (Hold ups) and the velocity magnitude for an unsteady system from the initial and boundaries conditions were established.

Keywords : three-phase fluidized bed system, CFD simulation, mesh dependency study, hydrodynamic study
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