Computational modeling of the sintering process of the ceramic particles in a fluidized bed furnace

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A sintering process of the ceramic particles is the gas-solid two-phase flow which is frequently encountered in many industrial fluid flow processes . This paper presents a computational modeling study of the gas-solid flow in the fluidized bed furnace by means of three-dimensional Computational Fluid Dynamics and the discrete phase model using a commercial computational fluid dynamics code, FLUENT 6.3.26. The motion of ceramic particles is calculated by discrete phase model which is applied the Newton's laws of the motion to individual particles and the flow of hot air is described by the Navier-Stokes equation. Simulations were performed inside the furnace, varying the additional inlet mass flow rate and the distributor's hole diameter.

Through this simulation, it is possible to visually observe the temperature and velocity distribution inside the furnace, and we can optimize the process parameters for the sintering of the ceramic particles. Numerical results of a three-dimensional fluidized bed are compared to experimental results in order to validate this model.