

Simulation study on the influence of ignition location and feeding temperature during powder free falling

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ABSTRACT

This paper presents the findings on the influence of ignition positions at various feeding temperatures on pressure and temperature profiles in silo using computational fluid dynamics code, FLUENT. The RNG k- ϵ model is used to simulate the turbulence of the gas phase, and the species transport model was selected within the disperse phase model to enable the prediction of dust cloud combustion. The finite rate-eddy dissipation model was employed in the combustion model. The result shows that the pressure was decreased about 16% when the ignition location is located at the bottom of the silo compared to the ones at the middle. It was found that the ignition source would not induce a dust explosion when the feeding and surrounding temperatures are equal. Findings reported in this work enhanced understanding of the ignition sensitivity arising from dust-air mixtures during the silo filling operation.

KEYWORDS

Ignition positions; Combustion model; Ignition sensitivity

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