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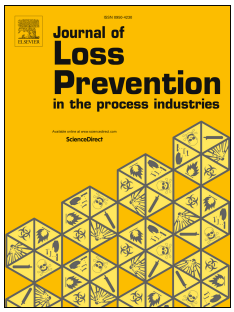

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Investigation of dust dispersion in a modified Hartmann tube using positron emission particle tracking and simulations

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Abstract

An important research tool that is used for assessing fundamental dust explosion characteristics is the Hartmann apparatus, where dust is dispersed by a pressure wave. Nevertheless, it is questionable as to whether the formed dust cloud is uniformly dispersed as well as how the solid particles behave as they flow. In this study we used two research tools. The first one is the novel experimental technique Positron Emission Particle Tracking (PEPT). It derives from Positron Emission Tomography (PET) technique that is normally used in the medical environment. PEPT is a technique of tracking individual particles and can be used for studying multiphase flows. Thus the main objective of this paper is to demonstrate how this method can be used for studying such systems. The second tool we used in this research is numerical simulations in which the Eulerian-Lagrangian approach was adopted. Therefore the second main objective of the paper is to investigate the flow of a single particle in the Hartmann apparatus and show the complexity of the problem. According to the experimental results the process is highly stochastic and influenced not only

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