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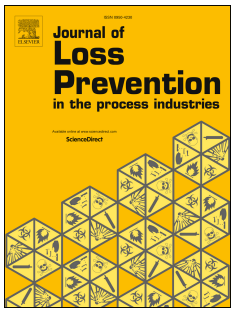

Effects of particle size on flame structures through corn starch dust explosions

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Effects of particle size on flame structures through corn starch dust explosions

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Abstract

The effects of particle size on the structures of flame reaction zone and preheat zone of corn starch dust were investigated. Corn starch dust with three different average particle sizes were chosen to conduct explosion experiments in a half-closed vertical duct. A high-speed camera was used to record the flame propagation process and direct light emission images of flame propagation in duct were obtained. The structures of flame reaction zone and preheat zone were detected by an ion current probe and a fine thermocouple. The experimental results show that the structures of reaction zone and preheat zone vary with the particle size. There is a positive correlation between the particle size and the thickness of reaction zone and preheat zone. Meanwhile, the thickness of the two flame structures are determined under these experimental conditions. Additionally, the mass concentrations of dust clouds in duct are founded as a critical common factor for flame structure variation.

***Keywords*:** dust explosion; particle size distribution; flame structure; ion current probe

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