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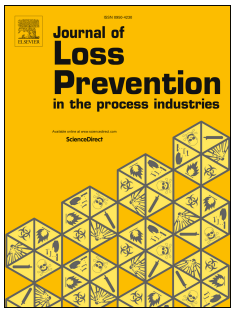

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Experimental study of the flame geometrical characteristics of the crude oil boilover fire under cross air flow

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Abstract: This paper presents an experimental investigation of the flame geometrical characteristics of the crude oil boilover fire under cross air flows. Circular crude oil boilover fire are burned under the horizontal cross air flows ranged in 0-1.5 m/s. The flame geometrical characteristics are recorded by a CCD (Charge-Coupled Device) digital camera. Results indicate that the crude oil boilover fire under cross air flow can be divided as initial growth stage, steady stage, boilover stage and decay stage. The average flame length in the both steady stage and boilover stage decreases with the increasing cross air flow speed when the speed (u) is less than 1.0 m/s and then increases. Furthermore, the initial fuel layer thickness (h_0) has a stronger influence on the average flame length in the boilover stage. The flame tilt angle increases fast when u rose from 0 to 1.0 m/s and then increases slowly. The tilt angle decreases with the pool diameter but weakly influenced by h_0. A new correlation equation based on the Richardson number is introduced to predict the flame tilt angle, which collapses the tangent value of the flame tilt angle well.

Key words: Boilover; Flame length; Flame tilt angle; Cross air flow

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