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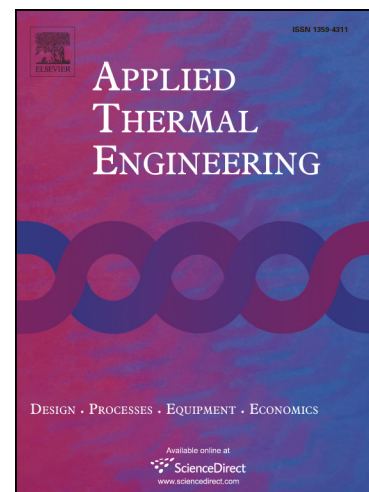
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# An Experimental Investigation of Burning Rate and Flame Tilt of the Boilover Fire under Cross Air Flows

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## Highlights

- A series of small scale crude oil boilover fire were conducted under cross air flow
- The change trends of mass burning rate and flame characteristics with cross air flow are analyzed
- Correlations of flame length and tilt angles for boilover fire are proposed and compared with previous results

**Abstract:** This paper presents an experimental investigation on mass burning rate and flame geometry characteristics of crude oil boilover fire under cross air flows. Three circular steel trays with different diameters, filled with crude oil with different initial layer thickness were used in this experiment. The cross air flow speed ranges from 0 to 1.5 m/s. The mass burning rates, flame length and tilt angle in the steady stage and boilover stage were recorded. The results show that the response of steady mass burning rate to cross air flow speed showed a non-monotonic trend, which firstly decreased and then increased with the critical cross air flow speed of 1.0 m/s. The boilover mass burning rate also shows a similar non-monotonic response to the cross air flow speed, with a critical value of 0.5 m/s. Such change trends are discussed based on the physical change of the dominant controlling mechanism in the heat

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