

PROCEEDINGS

Study on the Influence of the Longitudinal Position of the Fire Source on the Movement Behavior of the Asymmetric Flow Field in Tunnel Fire

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ABSTRACT

The longitudinal position of the fire source is one of the key parameters affecting the flow field characteristics in a long-distance tunnel. In this paper, a series of numerical simulations were carried out to analyze the influence of the longitudinal position and the heat release rate (HRR) on the induced airflow on both sides of the fire source and the smoke movement behaviors characteristics in the long-distance tunnel. It is found that under the induction of thermal pressure, an asymmetric induced air flow is formed near the fire source, resulting in asymmetric dynamic parameters of ceiling jet. The wind speed of the ceiling jet gradually decreases during the movement to the tunnel outlet, and the inertia force and turbulence intensity are continuously weakened. At a certain position, the ceiling jet will be reversely entrained by the induced airflow. The mass flow rate and thickness of the ceiling jet show the characteristics of increasing first and then decreasing in the longitudinal direction. In addition, A theoretical prediction model for the mass flow rate of the asymmetric flow field is proposed.

KEYWORDS

Tunnel fire; longitudinal position of fire source; asymmetric induced air flow; flow field

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