

عنوان مقاله:

Numerical Study on the Smoke Flow Characterization and Phenomenon of Plug-Holing under Lateral Smoke Exhaust in Tunnel Fire

محل انتشار:

دوماهنامه مکانیک سیالات کاربردی، دوره 11، شماره 1 (سال: 1396)

تعداد صفحات اصل مقاله: 12

نویسندگان:

J Yang - College of Safety and Engineering, Nanjing Tech University, Nanjing, China

X Pan - Institute of Fire Science and Engineering, Nanjing Tech University, Nanjing, China

Z Wang - Jiangsu Key Laboratory of Urban and Industrial Safety, Nanjing, China

M Hua - College of Safety and Engineering, Nanjing Tech University, Nanjing, China

خلاصه مقاله:

Although the lateral smoke extraction system had been adopted in the tunnel and subway, the research on the efficiency of the lateral smoke exhaust system is still lacking. A set of numerical simulations were conducted using Fire Dynamic Simulator (FDS) to analyze the plug-holing phenomenon under lateral smoke extraction system in the tunnel fire. Taking an actual lateral smoke exhaust system in a road tunnel as the prototype, a series of fire cases were simulated, wherein the heat release rate (HRR) of the fire source and mechanical exhaust rate, in particular, varied. The smoke flow characteristic in the lateral exhaust system is analyzed and phenomenon of plug-holing was observed. The temperature and smoke layer near the lateral smoke vent are analyzed, and results show that the phenomenon of plug-holing will decrease the lateral smoke exhaust system performance. The exhausting efficiency would not change significantly as the exhaust rate increasing. The critical Froude number we calculated to determine the phenomenon of plug-holing under lateral smoke exhaust in tunnel fire is 0.48, meanwhile, a saturated Froude number 1.95 was introduced by taking account of a better exhaust efficiency.

کلمات کلیدی:

CFD; Plug-holing; Mechanical smoke exhaust; Froude number

لینک ثابت مقاله در پایگاه سیویلیکا:

<https://civilica.com/doc/719863>

