Numerical Simulation of a Full Scaled Fire Test of the Tunnel with Natural Ventilation

Abstract

A mechanical ventilation system plays a major role in tunnels safety. Over the world, different ventilation systems regarding to the tunnel geometry and other parameters are used for tunnel ventilation in the normal and fire operations. However, in short tunnels depending on the tunnel geometry and traffic condition, there is the possibility of passing traffic through a tunnel without mechanical ventilation. Normally, natural ventilation is applied in short tunnels. In longer tunnels, additional measures in geometry such as openings or shafts are necessary to support natural ventilation. Due to the high costs of the electro-mechanical installations, maintenance and electricity power consumption for mechanical ventilation, having tunnels with natural ventilation system will be the best option. But, reliability of such ventilation systems in case of emergency must be substantiated before applying to tunnels. The main concern is a proper smoke evacuation in a fire case. In this survey, in order to set up a suitable CFD model, numerical simulation of a pre-conducted fire test by using same boundary conditions is done. These simulations were further extended to fires with higher capacities to show smoke and temperature behavior during the higher fires. The newest version of the FDS software (Fire Dynamic Simulator 6) was employed for simulations.
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- Rafiei, M., Sturm, P. J. 2014. Influence of fires on-air velocity measurements at downstream measurement locations. 7th International Conference Tunnel Safety and Ventilation, Graz, Austria, pp. 265-272.


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