

Numerical Simulation of CO dispersion in Northern-Koohsar Mahdi urban tunnel in Shiraz

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Abstract

Recent developments in tunnel ventilation have increased the immediate need for removing exhaust gas emitted from vehicles in road tunnels. The objective of this study is to assess the effect of jet fans on extracting detrimental gases emitted from vehicles in Northern-Koohsar Mahdi urban tunnel in Shiraz, such as Carbon Monoxide, CO, dispersion along the tunnel. The effects of mountain blocks, located at the inlet and outlet of tunnel, on flow field are also investigated. Furthermore, the present study aims to develop a new method for jet fan simulation which presents a more accurate model of the jet fans. Computational Fluid Dynamic (CFD) is carried out to simulate the ventilation in the tunnel, while the k- ϵ model is used for turbulence modeling. The results present that existence of mountain blocks in the inlet and outlet of the tunnel affects dramatically on the flow field, causing 8.8% drop on the tunnel volume flow rate. Moreover, it is shown that due to the effect of jet fans, the average amount of CO in the tunnel is about 55.7 ppm, while the permissible level of this is 70 ppm, to be on the safe side.

Key words: *Computational Fluid Dynamic, Tunnel ventilation, Jet fan, Mountain block, Carbon Monoxide.*