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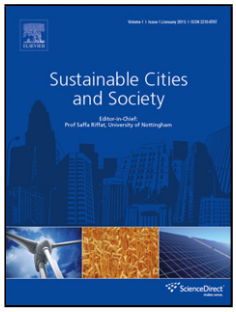

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Influence of Opening Area Ratio on Natural Ventilation in City Tunnel under Block Transportation

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ABSTRACT.

In order to analyze the influence of opening area ratio on natural ventilation in city tunnel under block transportation, dimensionless analysis, model experiment and CFD (computational fluid dynamics) simulation are used to evaluate the velocity distribution, temperature distribution and the pollutants concentration. The similarity criterion of thermal-pressure ventilation and proportional constant of the heat with the same temperature distribution are obtained by the dimensionless analysis about the thermal buoyancy and gravity of the most adverse section at block transportation. According to the similarity conditions, several groups of model experiments and computer models are built. Results of the model experiments and CFD simulations show that with the increase of opening area ratio, the effect of the natural ventilation improves at the beginning, but as opening area ratio continues to increase, the role of natural wind pressure outside tunnel is strengthened. There are some uncertainties of the natural wind pressure which might lead to the ventilation effect decline. With the increase of opening area ratio, the construction cost of vent shaft increases observably at the same time. So it is of great significance for city tunnel to choose an appropriate

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