

What is the theoretical model for smoke exhaustion in solar chimney cavity?

Highlights

Can solar chimney group reduce smoke exhaustion in tunnel?

Results show that the solar chimney group can afford natural ventilation in tunnel without compromising the performance of smoke exhaustion through shaft. With absorbed more solar energy, increasing cavity amount and cavity width can effectively improve the ventilation performance but limited effect on smoke exhaustion.

Can a smoke exhaust shaft be used as a solar chimney?

The smoke exhaustion performance based on the solar chimney may be better than those of conventional shaft as it can combine the natural ventilation and enhance the thermal buoyance. That provides the possibility to transform the existing smoke exhaust shaft into a solar chimney to reduce the construction cost and energy saving.

What is the theoretical model for smoke exhaustion in solar chimney cavity?

Theoretical model for smoke exhaustion The smoke exhaustion in solar chimney cavity is promoted by two parts heat source: high temperature smoke from fire source and solar radiation. The hot smoke coming from upstream side of chimney cavity, thus, the smoke exhausted through upstream cavity is more than that downstream.

Do solar chimney arrangements affect ventilation and smoke exhaustion capacity?

The influences of the solar chimney arrangements on ventilation and smoke exhaustion capacity were analyzed. Results show that the solar chimney group can afford natural ventilation in tunnel without compromising the performance of smoke exhaustion through shaft.

Can solar chimneys be used in a tunnel?

Solar chimneys offer energy-efficient building ventilation, but their application in tunnels, especially for smoke extraction, remains underexplored. This study experimentally and theoretically investigates solar chimney performance in a tunnel under normal ventilation and fire conditions.

How do you calculate smoke exhaustion through a solar chimney group?

For the smoke exhaustion through the downstream cavity in the solar chimney group, the smoke flow is driven by two parts: the heat source of downstream smoke and solar radiation. Based on the energy conservation, the downstream smoke heat source can be given by, (26) $E_{d+1} = E_s + 1 d E_j$

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Solar container smoke exhaust

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