

## **Three-Dimensional Numerical Model of an Earth Air Heat Exchanger under a Constrained Urban Environment in India: Modeling and Validation**

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**Abstract :** This study investigates the effectiveness of a typical Earth Air Heat Exchanger (EATHE) for energy efficient space cooling in an urban environment typified by space and soil-related constraints that preclude an optimal design. It involves the development of a three-dimensional numerical transient model that is validated by measurements at a live site in India. It is found that the model accurately predicts the soil temperatures at various depths as well as the EATHE outlet air temperature. The study shows that such an EATHE, even when designed under constraints, does provide effective space cooling especially during the hot months of the year.

**Keywords :** earth air heat exchanger (EATHE), India, MATLAB, model, simulation

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