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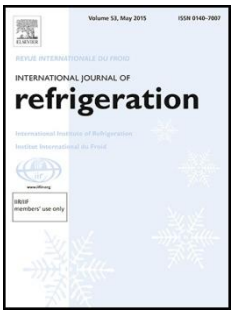

Title: Experimental study of heat and mass transfer characteristics in a cross-flow heating tower

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Experimental study of heat and mass transfer characteristics in a cross-flow heating tower

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Highlights

- Experimentally studies of heat and mass transfer characteristics of a cross-flow heating tower.
- A coupled heat and mass transfer model is developed and solved with finite difference method.
- Correlation expressions of heat and mass transfer coefficients are proposed.
- The Lewis number of heating tower conditions in this study is about 0.91~1.12.

Abstract: A heating tower heat pump(HTHP), as a novel integrated heating and cooling unit, is drawing more and more attention due to its high efficiency, low limitation of topographical conditions and no frost problems. The heating tower which can take advantage of energy from air is a significant unit of HTHP system and greatly affects system performance. This paper experimentally studies the heat and mass transfer characteristics of a cross-flow heating tower, which uses PVC structured packing and takes glycol as cycling fluid. Heat and mass transfer capacities, as well as heating efficiency, are adopted as performance indices. The effects of the inlet parameters, including air and solution flow rates, air inlet temperature and humidity ratio, solution inlet temperature and concentration, on the indices are investigated. Besides, a coupled heat and mass transfer model is developed and solved with finite difference method without the assumption of Lewis number. Correlation expressions of heat and mass transfer coefficients are proposed, which are in good agreement with the