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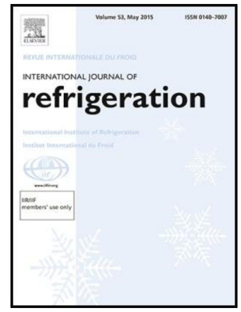

Title: A numerical model for a dew-point counter-flow indirect evaporative cooler using a modified boundary condition and considering effects of entrance regions

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A numerical model for a dew-point counter-flow indirect evaporative cooler using a modified boundary condition and considering effects of entrance regions

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Highlights

- A new numerical model was presented for dew-point coolers.
- The model was developed using a modified boundary condition.
- Effect of developing flows in channels was integrated into the model.
- The model has superior accuracy compared to previous models.
- Parametric analysis of the system was studied using the numerical model.

Abstract

A numerical model for dew-point counter-flow indirect evaporative coolers was presented. Unlike the conventional models, a more realistic boundary condition on separating wall was obtained by simultaneous solving of momentum, energy, and mass transfer equations of flows coupled. In addition, the model's accuracy was increased through considering 3D hydrodynamical and thermal developing flows. The model predicted the supply air temperature and the results were compared to experimental data as well as previous numerical models. It was shown that the maximum deviation of the supply air temperature was under ±3.53 %. It was found that these modifications on the numerical model reduced the computation error about 41.1 %. Moreover, it was found that the difference between maximum