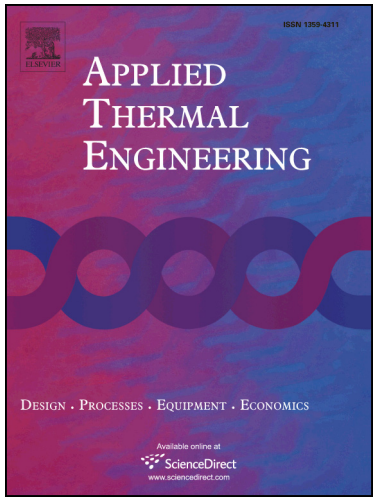

An Indirect Evaporative Heat Pump System

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An Indirect Evaporative Heat Pump System

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Abstract: A new indirect evaporative heat exchanger with a novel structure was invented to accelerate the mass and heat transfer. An appropriate heat pump system was attached to the new heat exchanger. The performance parameters of the system were analysed through a series of tests. In the cooling mode, the system was operated under normal conditions and at a high ambient temperature. The ambient air temperature was in the range of 25-40°C. The relative humidity was in the range of 30%-60%. The optimum spray flow rates were 1, 2 and 3 L/min. The tested air flow rates were 8000, 10000 and 12000 m^3/h. In the heating mode, the ambient air temperature was in the range of -5 to 5°C.The relative humidity was in the range of 35%-65%. The optimum spray flow rate and the air flow rate were the same as those used in the cooling mode.We found that frost did not develop in the equipment during the heating mode and the equipment was still able to operate at a relatively high Coefficient of Performance. The system operated in a stable level when ambient air temperature is high and dry.

Keywords: Indirect evaporative heat exchanger, heat enhancement, heat pump