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EFFECTS OF FIN SPACING AND FIN HEIGHT OF CAPILLARY-ASSISTED TUBES ON THE PERFORMANCE OF A LOW OPERATING PRESSURE EVAPORATOR FOR AN ADSORPTION COOLING SYSTEM

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Abstract

Adsorption cooling systems (ACS) are a viable alternative to vapor compression refrigeration cycleswhere low-grade waste heat is abundant. When using water as a refrigerant in an ACS, the operating pressure is quite low (<5 kPa) and the performance of the system is severely affected when using conventional evaporators. This problem can be addressed by using capillary-assisted evaporators. In this study, a new capillary-assisted evaporator testbed is designed and built, and three enhanced tubes with different fin geometries (fin spacing and fin height) and a plain tube are tested under different chilled water inlet temperatures. The results show that enhanced tubes provide 1.65-2.23 times higher total evaporation heat transfer rate compared to the plain tube. Under equal inner and outer heat transfer surface area, the results also show that the enhanced tube with parallel continuous fins and higher fin height (Turbo Chil-26 FPI) has 13% higher evaporation heat transfer coefficient than that of a tube with lower fin height (GEWA-KS-40 FPI).