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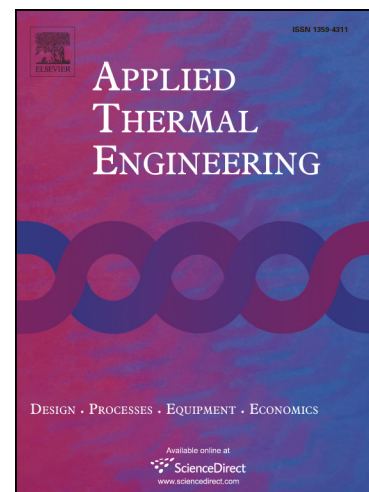
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Analysis on integrated low grade condensation heat powered desiccant coated vapor compression system

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Abstract

Hybrid solid desiccant and vapor compression system is developed to realize independent control of temperature and humidity. However the large volume has always hindered further development and heat pump system based on desiccant coated heat exchanger (DCHE) is proposed to solve the problem. It's DCHE instead of conventional sensible heat exchanger is adopted as evaporator/condenser in this system, which also serves as a bridge to link conventional solid desiccant system and vapor compression system together. Simulation model is established in this paper to analyze system performance operating as separate air conditioner. It is found that under new operation condition with higher evaporation temperature and taking COP, pressure and flammability into account, R134a is recommended as refrigerant. Switch time is identified as crucial parameter to avoid condensation. In full fresh air mode, 20s-300s and 30s-180s are the recommended switch time under ARI summer and humid conditions respectively. Also, switch time around 100s can obtain the highest cooling capacity. For hot and humid summer time in Shanghai, the system can't meet the indoor requirement with full fresh air mode. However, decreasing the handled load is proved to be effective method. Also the system can obtain the overall COP as high as 5.8 under simulation conditions.

Key words: Solid desiccant; Simulation; Performance; Heat pump.

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