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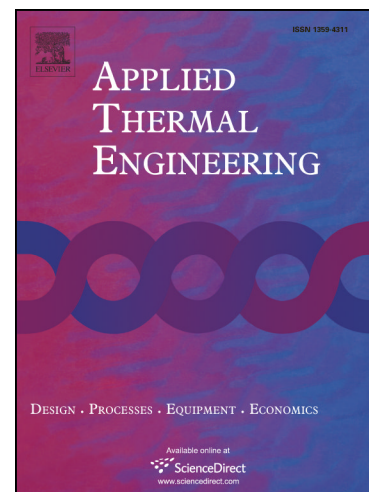
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Air–water dual-source heat pump system with new composite evaporator

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Abstract: Several renewable energy sources based on composite heat pump technology, which has been gaining increasing attention, are combined for application in building areas to obtain high operation efficiency and maximize energy saving. In this study, two kinds of air–water dual-source composite evaporators, namely, evA and evB (a new type), are proposed and air–water dual-source composite heat pump (AWSHP) systems with evA and evB are established. The AWSHP-evA and AWSHP-evB systems can be run in different modes, including air source heating mode (ASHM), water source heating mode (WSHM), and air–water source heating mode (AWSHM). The AWSHP-evB system has several advantages over the AWSHP-evA system, such as better coefficient of performance (COP), wider ambient temperature range for the efficient operation of AWSHM, and several different defrosting modes. A comparison of the experimental results obtained under different test conditions shows that COP_{WSHM} of AWSHP-evB can be enhanced by 6.3% to 9.8%, whereas COP_{ASHM} of AWSHP-evA and AWSHP-evB are identical. Meanwhile, COP_{AWSHM} of AWSHP-evB system can be enhanced by 8.8% to 13.3% in test conditions when hot water temperature is increased from 18 ± 1.0 °C to 51 ± 1.0 °C.

Key words: dual-source heat pump, composite evaporator, coefficient of performance,

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