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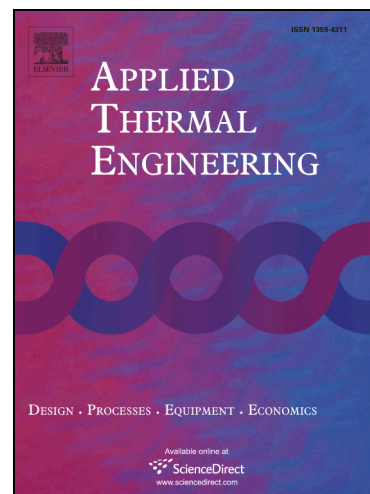
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Experimental study of a control strategy for a cascade air source heat pump water heater

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ABSTRACT

Cascade air source heat pump water heater is suitable for provide high temperature water under a wide range of outdoor air temperature. Most previous studies focused on the operating characteristics of cascade heat pump system, performance improvement, and the selection of optimal intermediate temperature. However, no reported studies on the control strategies for cascade heat pump may be identified. This paper proposed a control strategy for cascade air source heat pump water heater to adjust the load variation. The principle that two stage compression ratio is approximately same is used to determine the intermediate pressure. The intermediate pressure, degree of superheat (DS) and the evaporating temperature were regulated by the compressor, electronic expansion valves (EEV) and the evaporator fan of the low temperature (LT) cycle, respectively, through Proportion Integration Differentiation (PID) controller or proportional controller. The control strategy was experimentally tested over a wide operational range of cascade air source heat pump water heater.

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