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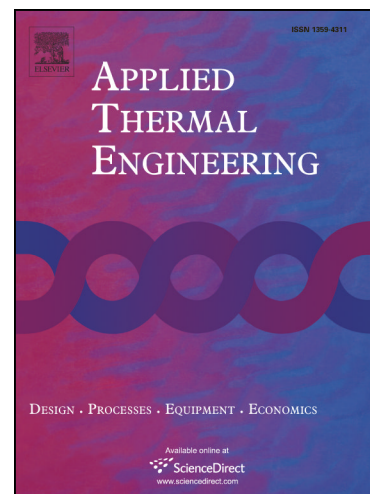
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A study of heat-pump fresh air exchanger

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Abstract

Fresh air exchange without using heat recovery ventilator in a closed space causes additional power consumption of the air conditioner. In the present study, we propose a novel design of heat-pump fresh air exchanger (HPFAE) which utilizes a heat pump to cool the intake outdoor hot fresh air in the evaporator before entering the room and to cool the condenser using the exhausted cold indoor air to increase COP of the heat pump. Three prototypes were built from retrofitting a window-type air conditioner and tested. The HPFAE with an additional boost fan (HPFAE-B) is shown to be able to reduce power consumption. The net COP (COP_{FAE}) for room cooling reaches 3.76 which is higher than COP of the original air conditioner (3.42). This shows that HPFAE can provide space cooling with fresh air exchange and reduce power consumption.

Keywords: indoor air quality (IAQ), fresh-air exchange, energy saving, energy recovery

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