

能源和环境工程

太阳能与空气复合源热泵热水系统多模式运行实验特性

张月红, 徐国英, 张小松

东南大学能源与环境学院

收稿日期 2009-6-22 修回日期 2009-11-21 网络版发布日期 2010-3-2 接受日期

摘要

提出并构建了一种直接膨胀式太阳能与空气复合源热泵热水系统。在南京夏季的晴天、阴天及冬季晴天工况下分别对实验样机的运行特性进行研究。实验结果表明: 该系统在不同天气下以不同热源模式高效地将热水加热到 55℃。在夏季晴天太阳辐射波动较大时, 系统的集热/蒸发器可以同时吸收太阳辐射能和空气热量, 以太阳能为主, 空气源为辅, 平均能效比为 4.83; 在夏季阴天, 系统以空气源热泵模式稳定运行, 平均能效比为 3.97; 在冬季晴天, 系统以太阳能热泵模式运行, 太阳能的输入提高了热泵蒸发温度, 从而缓解了蒸发器结霜问题。

关键词

[热泵热水器](#) [太阳能与空气复合源热泵](#) [集热/蒸发器](#) [运行特性](#) [能效比](#)

分类号

Experimental characteristics of solar-air source heat pump water heating system operating in different modes

ZHANG Yuehong, XU Guoying, ZHANG Xiaosong

Abstract

A direct-expansion type solar-air source heat pump water heating system was developed. An experimental prototype was investigated under different weather conditions in summer and winter in Nanjing, China. Experimental results showed that the prototype could heat water up to 55℃ efficiently by using different heat sources. When there was a large fluctuation of solar radiation on a sunny day, the collector/evaporator absorbed heat from both solar radiation and air, the prototype operated steadily in the solar-air dual source mode, with a high averaged energy efficiency ratio (EER) of 4.83. Meanwhile, it operated in the air-source mode with an averaged EER of 3.97 in a rainy day. Also, on a cold sunny day in winter, it operated in the solar-source mode with a relatively higher evaporation temperature compared with air-source heat pump, thus avoiding defrosting for the evaporator.

Key words

[heat pump water heater](#) [solar-air source heat pump](#) [collector/evaporator](#) [operating characteristics](#) [energy efficiency ratio](#)

DOI:

扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF\(1268KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

相关信息

▶ [本刊中 包含“](#)

[热泵热水器” 的相关文章](#)

▶ [本文作者相关文章](#)

· [张月红](#)

· [徐国英](#)

· [张小松](#)