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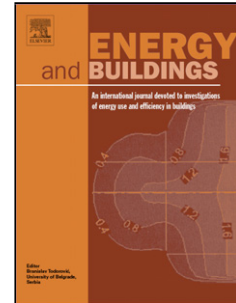
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**Energy and exergy analysis of solar integrated air source heat pump
for radiant floor heating without water**

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Highlights

- The solar integrated air source heat pump with R407c for radiant floor heating without water is investigated.
- The exergy efficiencies of components and systems are evaluated.
- The operating characteristics of components and systems are discussed.
- The COPs, process quality number and improvement potential of systems are compared.

Abstract

The solar integrated air source heat pump (SIASHP) with R407c for radiant floor heating without water (RFHW) is proposed and investigated. The first generation of prototype of SIASHP RFHW system developed is suitable for marketization at the present. On the basis of experiment room in Taiyuan, the energy and exergy analysis of SIASHP RFHW system are implemented, compared with the same type of conventional air source heat pump (ASHP). On the condition of -9.9°C outdoor calculated dry-bulb temperature for space heating in winter, Taiyuan and a $130\text{W}/\text{m}^2$ solar irradiance, the 76.8% exergy efficiency of

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