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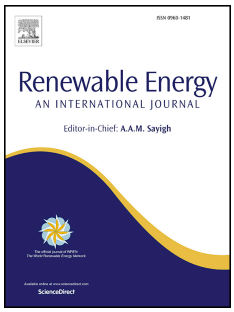

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Advantages of variable driving temperature in solar absorption chiller

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Abstract

The study described in this paper results from the observation that, when dealing with solar-driven absorption chillers, a compromise situation very likely exists between the collector efficiency and the coefficient of performance (COP) of the absorption cycle. An idea of a control strategy pursuing this objective, and thereby increasing the solar fraction for a solar absorption cooling cycle is consequently presented. The advantage of operating the solar chiller on a variable driving temperature is demonstrated. The theoretical analysis considers a solar chiller operated under moderate climate conditions of Poland. The model of the ammonia-water absorption chiller is described in detail, and the main assumptions of the iterative control procedure are explained. The effects of its application are computationally tested for one location and one type of solar collector, for representative days of three months during the cooling season. The results of the simulation are compared with the reference case of fixed driving temperature. According to the simulation results, it is possible to increase the cooling power yield at various levels, up to 34 W per 1 m^2 of solar collector, by adjusting the chiller driving temperature throughout the cooling season. The same, it is possible to more than double the cooling effect for some hours, with respect to fixed-temperature control operation.

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