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Solid desiccant solar air conditioning unit in Tunisia: numerical study

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Highlights

- Three different configuration of desiccant cooling system are simulated under different climatic conditions.
- Solid desiccant cooling based on the use of fixed solid desiccant bed is studied.
- Mathematical model based on heat and mass transfers' balances is developed.

Abstract

In this paper, a method for the provision of the human thermal comfort through solar activated solid desiccant cooling technologies is discussed. These technologies were numerically studied under different Tunisian climatic conditions (relatively cold and humid: Bizerte; hot and dry: Remeda; moderate: Djerba). The studied solid desiccant cooling is based on the use of a fixed solid desiccant bed instead of a rotary desiccant wheel. The development of the mathematical equations modeling the functioning of the different components (solid fixed bed, heat exchanger, humidifier, solar collector) is based on heat and mass transfers' balances. Results showed good functioning and applicability of these studied systems for various outdoor conditions of the major Tunisian cities.

Key words: Solar energy; air conditioning; desiccant cooling; dehumidification; solid desiccant; evaporative cooling

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Nomenclature

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