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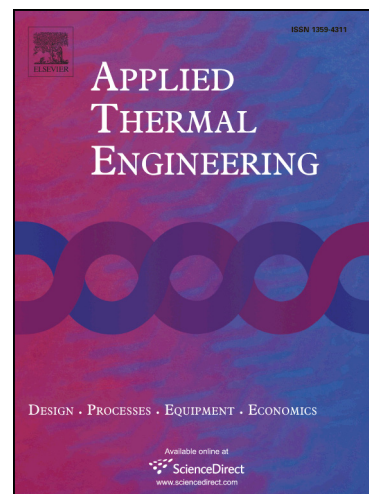
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**Evaluation of soil thermal potential under Tunisian climate using a new conic basket
geothermal heat exchanger: Energy and Exergy analysis**

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Abstract

Geothermal heat exchangers system composed of two conic baskets serially connected is designed and realized. Both heat exchangers are made in polyethylene high-density material and have a length of 3 m each one. They will be used for greenhouse cooling and heating through a geothermal heat pump. Its conical geometry is selected to reduce the operation cost and the exploited area, compared to vertical and horizontal geothermal heat exchangers often used. It also assure the maximum of heat exchange with the soil. The aim of this study is to determine the thermal performance of one Conic Basket Geothermal Heat Exchanger (CBGHE), buried at 3 m deep, in the exploitation of the soil thermal potential, in summer. A rate of heat exchange with the soil is determined and the global heat exchange of the CBGHE is assessed. Its energy and exergy efficiencies are also evaluated using both first and second law of thermodynamic. Results show that the specific heat exchange ranges between 20 Wm^{-1} and 50 Wm^{-1} . Maximal energetic and exergetic efficiencies of the CBGHE, equal to 62% and 37% respectively, are reached for a mass flow rate of 0.1 kg.s^{-1} . For this value of mass flow rate, the overall heat exchange coefficient is of $52 \text{ Wm}^{-2} \text{ K}^{-1}$.

Keywords: Geothermal Heat Exchanger, Overall exchange coefficient, Energy analysis; Exergy analysis; Charging and discharging process.

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