# Performances Analysis and Optimization of an Adsorption Solar Cooling System

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**Abstract :** The use of solar energy in cooling systems is an interesting alternative to the increasing demand of energy in the world and more specifically in southern countries where the needs of refrigeration and air conditioning are tremendous. This technique is even more attractive with regards to environmental issues. This study focuses on performances analysis and optimization of solar reactor of an adsorption cooling machine working with activated carbon-methanol pair. The modeling of the adsorption cooling machine requires the resolution of the equation describing the energy and mass transfer in the tubular adsorber that is the most important component of the machine. The results show the poor heat conduction inside the porous medium and the resistance between the metallic wall and the bed engender the important temperature gradient and a great difference between the metallic wall and the bed temperature; this is considered as the essential causes decreasing the performances of the machine. For fixed conditions of functioning, the total desorbed mass presents a maximum for an optimal value of the height of the adsorber; this implies the existence of an optimal dimensioning of the adsorber.

**Keywords :** solar cooling system, performances Analysis, optimization, heat and mass transfer, activated carbon-methanol pair, numerical modeling

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