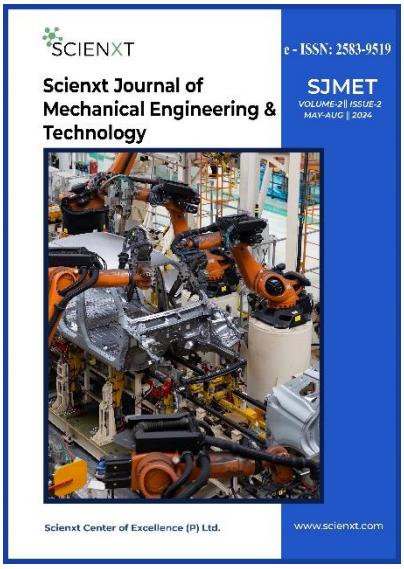

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Investigating novel approaches to improve the productivity of solar stills: a study on transport parameters and design optimization

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Abstract:

The solar still, operating on solar desalination principles, offers a solution to the challenge of obtaining potable water without relying on high-grade energy sources. Particularly valuable in remote regions with limited access to electrical power, solar stills have the potential to provide fresh water. However, their productivity in producing drinkable water is hindered by various factors. To address this issue, it is essential to investigate the modeling and transport parameters for designing more efficient solar stills.This study presents a multi-phase, three-dimensional Computational Fluid Dynamics (CFD) model of a single slope solar still. The model enables the simulation of temperatures at different points within the still. Comparisons between simulation results and experimental data demonstrate good agreement. Additionally, the study explores the impact of basin water depth on distillation yield. Interestingly, it is found that basin water depth has minimal effect on solar still productivity. For instance, reducing the initial basin water quantity from 20 liters to 10 liters resulted in a mere 5.13% increase in distillate output.

Keywords:

Solar still, desalination, Multiphase, CFD mode