

Mathematical Model for Output Yield Obtained by Single Slope Solar Still

Authors : V. Nagaraju, G. Murali, Nagarjunavarma Ganna, Atluri Pavan Kalyan, N. Sree Sai Ganesh, V. S. V. S. Badrinath

Abstract : The present work focuses on the development of a mathematical model for the yield obtained by single slope solar still incorporated with cylindrical pipes filled with sand. The mathematical results obtained were validated with the experimental results for the 3 cm of water level at the basin. The mathematical model and results obtained with the experimental investigation are within 11% of deviation. The theoretical model to predict the yield obtained due to the capillary effect was proposed first. And then, to predict the total yield obtained, the thermal effect model was integrated with the capillary effect model. With the obtained results, it is understood that the yield obtained is more in the case of solar stills with sand-filled cylindrical pipes when compared to solar stills without sand-filled cylindrical pipes. And later model was used for predicting yield for 1 cm and 2 cm of water levels at the basin. And it is observed that the maximum yield was obtained for a 1 cm water level at the basin. It means solar still produces better yield with the lower depth of water level at the basin; this may be because of the availability of more space in the sand for evaporation.

Keywords : solar still, cylindrical pipes, still efficiency, mathematical modeling, capillary effect model, yield, solar desalination
Conference Title : ICAREES 2021 : International Conference on Application of Renewable Energy and Environmental Sustainability

Conference Location : New York, United States

Conference Dates : April 22-23, 2021