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Enhancement of potable water production from an inclined photovoltaic panel absorber solar still by integrating with flat-plate collector
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Abstract

This manuscript brings out with an enhancement of the freshwater productivity from the active inclined solar panel basin solar still (AISPBS). The research was conducted on the AISPBS by the diversified mass flow rate of water (mf). The maximum freshwater yield obtained at mf at 1.8, 3.2 and 4.7 kg/h is 7.5, 6.5 and 5.4 kg, respectively. The daily average thermal and exergy efficiency of the AISPBS at mf at 1.8, 3.2 and 4.7 kg/h is 43.71, 38.27 and 29.62% and 8.39, 6.94 and 5.08%, respectively. The daily average PV panel power production of 47.71, 49.84 and 53.83 watts, electrical efficiency of 7.2, 7.6 and 8.1%, thermal efficiency of 17.3, 18.3 and 19.7%, exergy efficiency of 18.32, 20.23 and 22.39%, the overall thermal efficiency of 61.39, 57.44 and 51.37% and the overall exergy efficiency of 26.52, 27.14 and 27.40% are obtained from the system under mf at 1.8, 3.2 and 4.7 kg/h, respectively. When mf increases, there are decreases in the AISPBS distillate yield, thermal, exergy and the overall thermal efficiency and increases in the PV panel power production and electrical, thermal, exergy and the overall exergy efficiency. Further, energy return term and carbon credit attained for the AISPBS have been calculated. It was found that payback period of 20, 18.7 and 17.5 years and carbon credit earned of 21, 25 and 30 \$ are obtained at mf at 1.8, 3.2 and 4.7 kg/h, respectively. © 2019, Springer Nature B.V.

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