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Improving the productivity of a falling film solar desalination unit

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Abstract: This study aimed at improving the productivity of a falling film solar desalination unit by cooling the glass cover and by improving the hot surface wettability. The glass cover was made of double layers through which cooling water passes. The advantage of this design is that the latent heat of evaporation is absorbed by the cooling water and returned to the system. The effect of the various parameters such as feed water flow rate, cooling water flow rate, weather conditions, solar irradiation intensity, and collector's surface area were investigated. The results showed that increasing the cooling water flow rate enhanced fresh water production. The productivity of the unit decreased with increasing feed water flow rate. Recycling the hot water to the feed water tank improved the productivity of the unit from 0.13 L/hr to 0.18 L/hr (~ 34%). Fog formation on the double glass cover was found to reduce the productivity of the unit. Modifying the surface of the black plate with cotton cloth or with plastic strips improved the productivity by 50% (0.13 L/hr to 0.19 L/hr).