

عنوان مقاله:

An Experimental Study of the Effect of High Electric Field on Mass Transfer Enhancement

محل انتشار:

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خلاصه مقاله:

Applying corona wind as a novel technique can lead to a great level of heat and mass transfer augmentation by using a very small amount of energy. The enhancement of forced flow evaporation rate by applying electric field (corona wind) has been experimentally evaluated in this study. Corona wind produced by a fine wire electrode charged with positive high DC voltage impinges on water surface and leads to an evaporation enhancement by disturbing the saturated air layer over water surface. The study was focused on the effect of corona wind velocity, electrode spacing, and air flow velocity on the level of the evaporation enhancement. Two sets of experiments, i.e. with and without electric field, have been conducted. The data obtained from the first experiment were used as a reference for the evaluation of the evaporation enhancement in the presence of electric field. The applied voltages ranged from corona threshold voltage to spark over voltage with increments of 1 kV. The results shows that corona wind has a great enhancement effect on water evaporation rate, but its effectiveness gradually diminishes by increasing air flow velocity. The maximum enhancements are 7.3 and 3.6 times for air velocities of 0.125 and 1.75 m.s⁻¹ respectively.

کلمات کلیدی:

Electrohydrodynamics (EHD), Corona Wind, High Electric Field, Evaporation Enhancement

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