

عنوان مقاله:

Experimental prediction of flow boiling heat transfer coefficient of Water and Copper Oxide nanofluid using ANNOVA technique

محل انتشار:

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خلاصه مقاله:

In the present work the flow boiling characteristics of CuO/water nanofluid were studied experimentally and the statistical as well as regression analysis were conducted to assess the flow boiling heat transfer coefficient and the influencing parameters. For this, CuO/water nanofluid was prepared by two step procedure for the particle concentration of 0.001%, 0.005%, and 0.01 % respectively. The experiments were conducted by varying the heat flux and mass flux ranging from of 50-200 kW/m² and 38-955 kg/s-m², respectively for water and CuO/water nanofluids. All the experiments were conducted for the same temperature of water at heater inlet. A full factorial multi-level design approach was used to design the experiments by considering the heat flux, mass flux and particle concentration are key influence parameters. Results showed that the boiling heat transfer is increases with mass flux and heat flux for both water and nanofluids. Furthermore, increasing the nanoparticle concentration enhances the flow boiling heat transfer rate and lowers the wall temperature. It is observed that at a mass flux of 954.29 kg/s-m², the maximum decrease in wall superheat is 18.66 % for 0.01% CuO/water nanofluid. From statistical analysis, it is noticed that the aforementioned factors were statistically significant. Furthermore, heat flux has a considerable influence on the boiling heat transfer coefficient, which is followed by mass flux and particle concentration. The heat transfer coefficient was predicted using a simplified quadratic model, which was found to be in good agreement with the experimental results

کلمات کلیدی:

CuO/water Nanofluid, Flow Boiling Curve, Heat Flux, Mass Flux, Heat Transfer Coefficient, Particle Concentrations

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