

Experimental Investigation on the Effect of Adding CuO Nanoparticles to R-600a Refrigerant on Heat Transfer Enhancement of a Horizontal Flattened Tube

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Abstract : An empirical investigation was performed in order to study the heat transfer characteristics of R600a flow boiling inside horizontal flattened tubes and the simultaneous effect of nanoparticles on boiling heat transfer in flattened channel. Round copper tubes of 8.7 mm I.D. were deformed into flattened shapes with different inside heights of 6.9, 5.5, and 3.4 mm as test areas. The effect of different parameters such as mass flux, vapor quality and inside height on heat transfer coefficient was studied. Flattening the tube caused significant enhancement in heat transfer performance so that the maximum augmentation ratio of 163% was obtained in flattened channel with lowest internal height. A new correlation was developed based on the present experimental data to predict the heat transfer coefficient in flattened tubes. This correlation estimated 90% of the entire database within $\pm 20\%$.

Keywords : nano particles, flattend tube, R600a, CuO

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020