

Void fraction of flow boiling with propane in circular horizontal tube

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Abstrak

An investigation into flow boiling void fraction was conducted to observe its characteristics and to develop a new correlation of void fraction based on the separated model. The study used a natural refrigerant of R-290, flowed in a horizontal tube of 7.6 mm inner diameter under experimental conditions of 3.7 to 9.6oC saturation temperature, 10 to 25 kW/m² heat flux, and 185 to 445 kg/m²s mass flux. The void fraction, calculated by the present experimental data, was used for comparison with 31 existing correlations, including model types as follows: homogeneous, slip ratio, K_{th} correlation, drift flux, and a model based on the Lockhart-Martinelli correlation (X_{tt}). A new void fraction correlation, as a function of liquid and vapor Reynolds numbers, was proposed, based on the data. The measured pressure drop was compared with some pressure drop correlations that use the newly developed void fraction combination. The best prediction was shown by the homogeneous model.