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Vertical Migration of a Gas Bubble and Non-Aqueous Phase Liquid Drop In A Noncircular Capillary Filled With Water During Phase Change KENT UDELL, University of Utah, HAE-WON CHOI, Cooligy — The upward migration of a denser non-aqueous phase (oil) liquid drop attached to a gas bubble inside a square capillary tube originally filled with water was studied for unheated and heated conditions. Under heated conditions where vaporization occurred, the bubble-liquid combinatory body vertical migration velocities increased with time and were greater than those of unheated bodies of similar geometry. An approximate model based on Stoke's flow is presented that suggests a relationship between the gas bubble length, the oil drop length and the upward migration velocity such that the migration velocity vary linearly with the body force. The model is in excellent agreement with the experimental data. Based on the data and theoretical considerations, it is concluded that the Gravity number, defined as the ratio of gravity forces to viscous forces, is constant at a value near 60,000 for all conditions examined. It is also speculated that a constant Gravity number would be observed for bubble-liquid drop flow in porous media as well.

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