Abstract Submitted
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Measurement of liquid film flow on nuclear rod bundle in micro-scale by using very high speed camera system[1] SON PHAM, ZENSAKU KAWARA, TAKEHIKO YOKOMINE, TOMOAKI KUNUGI[2], Department of Nuclear Engineering, Graduate School of Engineering, Kyoto University — Playing important roles in the mass and heat transfer as well as the safety of boiling water reactor, the liquid film flow on nuclear fuel rods has been studied by different measurement techniques such as ultrasonic transmission, conductivity probe, etc. Obtained experimental data of this annular two-phase flow, however, are still not enough to construct the physical model for critical heat flux analysis especially at the micro-scale. Remain problems are mainly caused by complicated geometry of fuel rod bundles, high velocity and very unstable interface behavior of liquid and gas flow. To get over these difficulties, a new approach using a very high speed digital camera system has been introduced in this work. The test section simulating a 3x3 rectangular rod bundle was made of acrylic to allow a full optical observation of the camera. Image data were taken through Cassegrain optical system to maintain the spatiotemporal resolution up to 7 μm and 20 μs. The results included not only the real-time visual information of flow patterns, but also the quantitative data such as liquid film thickness, the droplets' size and speed distributions, and the tilt angle of wavy surfaces. These databases could contribute to the development of a new model for the annular two-phase flow.

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