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Velocity and thickness measurement of a thin-liquid film via a single-tip optical fiber probe micro-fabricated by femtosecond pulse laser YUSUKE IKEDA, Faculty of Engineering, Shizuoka University, YUKI MIZUSHIMA, Graduate school of Science and Technology, Shizuoka Univerisity, TAKAYUKI SAITO, Research Institute of Green Science and Technology, Shizuoka University — Optical fiber probing is a simple and compact measurement system for a gas-liquid two phase flow. This probe detects a gas-liquid interface responsively. We have developed a new measurement technique for a thin-liquid-film that utilizes a single-tip optical fiber probe (Fs-TOP) micro-fabricated through femtosecond laser pulses. The Fs-TOP is installed horizontally along the channel base, and vertically traversed to the other side of the base. The signal from the Fs-TOP is sufficiently understood by using the originally developed 3D ray-tracing-numerical simulation. The maximum liquid film thickness was measured as well as the average liquid film thickness. Based on the simulation, it was found out that when a fraction of liquid phase is 52%, the installed position of the Fs-TOP is equal to the average liquid film thickness. We measured velocity of the liquid film by the Fs-TOP and visualization. The results accorded with each other, and implied that the Fs-TOP measurement was superior to the visualization, against a high-velocity flow.

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