

## Assessment of an Ultrasonic Sensor and a Capacitance Probe for Measurement of Two-phase Mixture Level

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### Abstract

We performed a comparison of two-phase mixture levels measured by an ultrasonic sensor and a two-wire type capacitance probe with visual data under the same experimental conditions. A series of experiments are performed with various combinations of airflow and initial water level using a test vessel with a height of 2m and an inner diameter of 0.3m. The ultrasonic sensor measured the two-phase mixture level with a maximum error of 1.77% with respect to the visual data. The capacitance probe severely under-predicted the level data in the high void fraction region. The cause of the error was identified as the change of the dielectric constant as the void fraction changes when the probe is applied to the measurement of the two-phase mixture levels. A correction method for the capacitance probe is proposed by correcting the change of the dielectric constant of the two-phase mixture. The correction method for the capacitance probe produces a r.m.s. error of 5.4%. The present experimental data are compared with the existing pool void fraction correlations based on drift-flux model. The Kataoka-Ishii correlation has the best agreement with the present experimental data with an r.m.s. error of 2.5%.