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Optical measurements of the velocity, height and frequency of disturbance waves in saturated two-phase annular flow.[1] TIAGO MOREIRA, University of Sao Paulo, ROMAN MORSE, KRISTOFER DRESSLER, University of Wisconsin-Madison, GHERHARDT RIBATSKI, University of Sao Paulo, LOUISE MCCARROLL, EVAN HURLBURT, Naval Nuclear Laboratory, GREGORY NELLIS, ARGANTHAEL BERSON, University of Wisconsin-Madison —
In two-phase annular flows, disturbance waves, i.e., large waves several times thicker than the mean thickness of the liquid film, strongly affect the heat transfer coefficient and pressure drop. In this study, an optical technique is used to simultaneously measure the instantaneous velocity and height, as well as the frequency of disturbance waves in an adiabatic two-phase annular flow of saturated R245fa. Instantaneous liquid film thickness is measured using the optical method initially proposed by Shedd and Newell (1998, https://doi.org/10.1063/1.1149232). In this method, the liquid film thickness is calculated from ring patterns made by light reflected at the interface of the liquid film. A new strategy for the post-processing of the ring patterns has been developed that allows the measurement of the instantaneous disturbance wave velocities. Detailed characterization of wave velocity, height, and frequency will be presented for flows with vapor qualities between 0.63 and 0.9. Results show that disturbance waves become slower and less frequent at the high vapor qualities.

[1]optical measurements of the velocity, height and frequency of disturbance waves in saturated two-phase annular flow

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