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Bubble breakup phenomena in a venturi tube AKIKO FUJIWARA, SHU TAKAGI, YOICHIRO MATSUMOTO, The University of Tokyo, Dept. Mechanical Engineering — Microbubble has distinguished characteristics of large surface area to unit volume and small buoyancy, and it has advantages in many engineering fields. Recently microbubble generators with low energy and high performance are required to wide applications. In the present study, we propose one new effective technique to generate tiny bubbles with less than 200 μm diameter utilizing venturi tube under high void fraction condition. The objective of the present study is to elucidate the mechanism of bubble breakup phenomena in the venturi tube and to clarify the effects of parameters which are necessary to realize an optimum system experimentally. Experiment was conducted with void fraction of 4% and variation of liquid velocity from 9 to 26 m/s at the throat. Under low velocity condition, bubbles which were observed with a high speed camera parted gradually in a wide region. On the contrary under high velocity condition, bubbles expanded after passing through the throat and shrank rapidly. Since the speed of sound in gas-liquid system is extremely lower than that of single-phase flow, the bubble breakup phenomenon in the venturi tube is explained as the supersonic flow in a Laval nozzle. By rapid pressure recovery in diverging area, expanding bubbles collapse violently. The tiny bubbles are generated due to the surface instability of shrinking bubbles.

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