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Manipulation of the behavior of SiC particles and oil bubbles using ultrasonic standing wave field

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Using ultrasound, particles submerged or flowing in fluid can be manipulated since ultrasound has an effect on the behavior of particles. Specifically, in standing wave field, particles generally move to pressure nodes or pressure antinodes due to acoustic radiation force. In this work, the behavior of SiC particles and oil bubbles in flowing water by standing wave field was investigated. Standing wave field in frequencies between 2 and 2.5 MHz was formed in a few mm narrow flow channel using a water coupled ultrasonic transducer and a steel reflector. We observed the effect of the standing wave parameters such as frequency, flow channel width, or sound intensity on the behavior of the particles. Various interesting results were obtained through some experiments. We separated SiC particles and oil bubbles. It was shown that the operating frequency of standing wave can control the particle moving location. Sound intensity increase also leads to the entrapment of moving particles. The resulted observations reveal the possibility of various applications of the ultrasonic standing wave to the manipulation of particles.