

Abstract Submitted  
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**Physical cleaning by bubbly streaming flow in an ultrasound field**

TATSUYA YAMASHITA, KEITA ANDO, Keio University — Low-intensity ultrasonic cleaning with gas-supersaturated water is a promising method of physical cleaning without erosion; we are able to trigger cavitation bubble nucleation by weak ultrasound under gas supersaturation and thus clean material surfaces by mild bubble dynamics. Here, we perform particle image velocimetry (PIV) measurement of liquid flow and cavitation bubble translation in an ultrasonic cleaning bath driven at 28 kHz and then relate it to cleaning tests using glass slides at which silica particles are attached. The ultrasound pressure amplitude at the cleaning spot is set at 1.4 atm. We select the supersaturation level of dissolved oxygen (DO) as a parameter and control it by oxygen microbubble aeration. It follows from the PIV measurement that the liquid flow is enhanced by the cavitation bubble translation driven by acoustic radiation force; this trend becomes clearer when the bubbles appear more densely as the DO supersaturation increases. In the cleaning tests, the cleaned areas appear as straight streaks. This suggests that physical cleaning is achieved mainly by cavitation bubbles that translate in ultrasound fields.

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