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Enhancement of focused jets by using surface microbubbles[1]
RYOSUKE YUKISADA, AKIHITO KIYAMA, Tokyo Univ of Agri & Tech, XUEHUA ZHANG, RMIT University, YOSHIYUKI TAGAWA, Tokyo Univ of Agri & Tech — Focused liquid jets are important for various key technologies, such as material deposition and automated pipetting. It has been challenging to create high speed jets of viscous liquids. Our latest work showed that it is possible to generate viscous jets by applying sudden acceleration to the liquid (Onuki et al., J. J. Multi. Flow, 2015). It was observed that under certain conditions cavitation bubbles form in the liquid, making important contribution to the increment of jet velocity (Kiyama et al., JFM, 2016). The increased velocity depends on the maximum size of expanding bubbles. Thus, for controlling the velocity of focused jets, it is crucial to control the bubble expansion. In this study, we investigate the effects of surface microbubbles on the focused jets. Before the impact is performed, the microbubbles are produced on an inner wall of the liquid container by using water-ethanol exchange technique. We experimentally measure the jet velocity and bubble motion utilizing a high-speed camera. It is found that surface microbubbles expand upon the impact, enhancing the increment of jet velocity under the conditions that do not trigger cavitation inception in the bulk liquid.

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