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Experimental study on the bubble-induced gravity–capillary jet-like surface waves.[1] YOUN J. KANG, YEUNWOO CHO, Korea Advanced Institute of Science and Technology (KAIST) — We experimentally study on the jet-like wave motion of a free surface caused by the motion of an electric-spark-generated underwater bubble near the free surface. The overall length scale of the bubble-induced free-surface jet is on the order of a few *mm*, where both the gravity and the surface tension are important. Three different motions of the gravity–capillary jet-like surface waves are observed depending on the inception position of the bubble (d) from the free surface, the maximum radius of the bubble (R_{m}) and the maximum height of the gravity–capillary surface jet (h) before pinch-off if any. When $d/R_{\mathrm{m}}>1.2$, the surface jet shows a simple smooth hump (case 1). When $0.7<d/R_{\mathrm{m}}<1.2$, a single or multiple droplets are pinched off sequentially or simultaneously at the tip or from some points of the surface jet (case 2). Finally, when $d/R_{\mathrm{m}}<0.7$, a series of squirting & jetting phenomena are observed at the top of the surface jet (case 3). In particular, for cases 1 and 2 ($d/R_{\mathrm{m}}>0.7$), we experimentally found the linearly proportional relationship between h/R_{m} and $(d/R_{\mathrm{m}})^{-4}$. This proportional relationship is proven semi-analytically using a scaling argument and conservation of mass, momentum, and energy.

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