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The Formation of Gas Jets and Vortex Rings from Bursting Bubbles ALI DASOUQI, Univ of South Florida, GEUM-SU YEOM, Kunsan National University, DAVID MURPHY, Univ of South Florida — Bubble bursting is important in ocean-atmosphere processes (e.g. marine aerosol formation), industrial processes (e.g. gas fluxing of molten metal), and food science (e.g. beer). The fluid mechanics of the liquid component of bubble bursting, including film cap retraction and droplet formation, has been well investigated. However, the ejection of pressurized gas from inside a bursting bubble, which may affect the spatial distribution of generated droplets, is much less understood. Here, we analyze the fluid dynamics of gas jets and vortex rings produced by the bursting of 440 m to 4 cm diameter smoke-filled bubbles resting at an air-water interface by using high speed stereophotogrammetry. The slow, low Reynolds number jets characteristic of small bubbles are attributed to high film retraction speeds which produce relatively large holes in the bubble cap; these jets roll up into spherical, slowly growing vortex rings traveling short distances. In contrast, the low film retraction speeds typical of large bubbles generate high speed, high Reynolds number jets ejected through relatively small apertures which roll up into highly oblate, fast-growing, far-traveling vortex rings. A quasi-one-dimensional nozzle model also is used to predict the initial velocity of the gas jet.

Ali Dasouqi
Univ of South Florida

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