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Bursting Bubbles and The Formation of Gas Jets and Vortex Rings ALI AL DASOUQI, DAVID MURPHY, University of South Florida — Bursting bubbles play an important role in ocean-atmosphere and industrial processes (e.g. marine aerosol formation, froth flotation for metal concentration) and food science (e.g. beer). Earlier work focused on the fluid dynamics of droplet formation (film and jet drops) and film cap retraction, but the ejection of pressurized gas from inside a bursting bubble, which may affect the spatial distribution of generated droplets, is much less studied. Here we examine the gas flow emerging from the bursting of smoke-filled bubbles floating at an air-water interface using two synchronized orthogonal high-speed cameras filming at 5-10 kHz. We describe the bubble bursting and subsequent formation of vortex rings for bubbles ranging in size from 400 microns to 4 cm. No vortex rings are formed for bubbles less than 1 mm diameter. The number of initially formed vortices increases from one for a 1.4 mm bubble up to six for a 39 mm bubble. Using stereophotogrammetric tracking, the initial speed of the gas jet released from the bursting bubble also is quantified and can reach up to 9.6 m/s for a 39 mm bubble. Jet speed is found to be a function of film retraction speed, bubble diameter, and bubble submergence. Successful vortex ring formation also is found to rely on film retraction behavior.

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