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Dynamic Characteristics at the Interface of Underwater Round Gas Jets CHRIS WEILAND, PAVLOS VLACHOS, Virginia Tech — The gas-liquid interface characteristics of round gas-jets submerged in water was studied across a wide range of Mach numbers (0.4-1.9). High speed shadowphotography was used to image the gas jet and the interface was tracked from the digital images for all points in space and time. The results show how the interface characteristics are governed by buoyancy to momentum driven flow as the Mach number increases. The jet penetration, defined as the maximum length a continuous gas jet occupies 99 percent of the time, increases with the injection Mach number. The penetration is related to the compressible jetting length, defined as the distance from the orifice where the momentum and buoyancy forces are balanced, and signifies a change in the jet behavior spatially from a momentum to buoyancy driven flow. The interface motion is computed as a function of the Mach number and the distance downstream from the orifice. These results indicate the most unsteady jetting process near the orifice occurs at Mach 1, presumably due to the formation of a shock cell structures.

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