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Formation of Micro-Scale Gas Pockets From Underwater Wall Orifices[1] FRANCISCO A. PEREIRA, CNR-INSEAN, The Italian Ship Model Basin, MORTEZA GHARIB, California Institute of Technology — Our experiments examine the formation of micro-scale gas pockets from orifices on walls with hydrophilic and hydrophobic wetting properties. Bubble injection is operated in a liquid at rest at constant flow rate and in a quasi-static regime, and the mechanism of bubble growth is investigated through high speed recordings. The growth dynamics is studied in terms of orifice size, surface wetting properties and buoyancy sign. The bubble formation is characterized by an explosive growth, with a pressure wave that causes the bubble to take highly transient shapes in its very initial stages, before stabilizing as a sphere and growing at a relatively slow rate. In case of positive buoyancy, the bubble elongates with the formation of a neck before detaching from the wall. When buoyancy acts towards the wall, the bubble attaches to the wall and expands laterally with a moving contact line. In presence of hydrophobic surfaces, the bubble attaches immediately to the wall irrespective of buoyancy direction and takes a hemispherical shape, expanding radially along the surface. A force balance is outlined to explain the different figures.

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Francisco A. Pereira
CNR-INSEAN, The Italian Ship Model Basin

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