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Numerical study on discharge generated in a helium bubble in water at atmospheric pressure[1] WEN YAN, Dalian Nationalities University, YANG XIA, Dalian University of Technology, ZHENHUA BI, Dalian Nationalities University — In this work, a 2D simulation of underwater discharge in a helium bubble at atmospheric pressure was performed. The dynamics of the discharge ignition, propagation and the formation of ROS were studied. Upon ignition, the discharge propagated mainly along the gas-water interface until a circle was formed. OH was found to be the dominant ROS in the bubble, followed by O and then H_2O_2. The influence of the voltage amplitude and the position of needle electrode on the discharge development, reactive species and corresponding fluxes to the gas-water interface was also investigated. As the voltage increased, the discharge was ignited earlier and the propagation path was closer to the gas-water interface. For the case of the needle tip inside the tube, the discharge was initiated as a surface streamer inside the tube, then exited the tube into the bubble with surface hugging discharge mode. For the case of the needle tip outside the tube, an additional volumetric discharge was observed, based on the surface hugging discharge. The densities of O, OH and their fluxes at the gas-water interface increased either by increasing voltage amplitude or moving the needle tip outside of the tube.

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Wen Yan
Dalian Nationalities University

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