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Effect of polarity and electric field uniformity on streamer propagation inside bubbles immersed in liquids[1] NATALIA BABAEVA, MARK KUSHNER, University of Michigan — Streamers propagating in bubbles immersed in liquids are of interest for the generation of radicals. Streamers often propagate along the surface of a bubble immersed in a liquid instead of propagating along the axis of the bubble. In this talk, we discuss results from a 2-d computational investigation of the propagation of streamers inside bubbles immersed in liquids. We show that dielectric constant and conductivity of the liquid, streamer polarity, degree of electric field non-uniformity and bubble size determine the axial or surface mode of streamer propagation. A bubble of humid air at atmospheric pressure is placed at the tip of corona discharge or near the opposite plane electrode. The bubble is immersed in a liquid of conductivity, σ, and permittivity, $\varepsilon/\varepsilon_0$ with radii up to 0.9 mm. For weakly-conducting liquids, the steamer propagates along the axis for low $\varepsilon/\varepsilon_0$ and along the surface for large $\varepsilon/\varepsilon_0$. The transition occurs at $4 < \varepsilon/\varepsilon_0 < 8$ for positive streamers and at $2 < \varepsilon/\varepsilon_0 < 4$ for negative, depending on the size of the bubble and voltage. For large values of σ and $\varepsilon/\varepsilon_0$,the streamer propagates along the surface for both positive and negative polarities. Streamers in bubbles in uniform fields develop from the equator of the bubble where the electric field is enhanced by bubble polarization.

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Mark Kushner
University of Michigan

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