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Electric field and electron orbits near a triple point DAVID M. FRENCH, NICHOLAS M. JORDAN, Y.Y. LAU, R.M. GILGENBACH, P. PENG-VANICH, University of Michigan — Triple point, defined as the junction of metal, dielectric, and vacuum, is the location where electron emission is favored in the presence of a sufficiently strong electric field. In addition to being an electron source, the triple point is generally regarded as the location where flashover is initiated in high voltage insulation, and as the vulnerable spot from which rf breakdown is triggered. In this paper, we focus on the electric field distribution at a triple point of a general geometry, as well as the electron orbits in its immediate vicinity. We calculate the orbit of the first generation electrons, the seed electrons. It is found that [1], despite the mathematically divergent electric field at the triple point, significant electron yield most likely results from secondary electron emission when the seed electrons strike the dielectric. The analysis gives the voltage scale in which this electron multiplication may occur. It also provides an explanation on why certain dielectric angles are vulnerable to electron multiplication over others, as observed in previous experiments [1]. This work was supported by AFOSR.

[1] N. M. Jordan et al., J. Appl. Phys. (in press, 2007)

David French
University of Michigan

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