

Abstract Submitted
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Modeling Vacuum Arcs¹ J. NOREM, Z. INSEPOV, TH. PROSLIER, ANL, D. HUANG, IIT, S. MAHALINGAM, Tech-X Corporation, S. VEITZER — We are developing a model of vacuum arcs to describe vacuum breakdown in 805 MHz systems, however the basic mechanisms at work should apply to other applications. The model assumes: 1) that arcs develop as a result of mechanical failure of the surface due to Coulomb explosions, 2) this is followed by ionization of fragments by field emitted currents and 3) the development of a small, dense plasma that interacts with the surface primarily through self sputtering and field emission, and 4) the plasma terminates as a unipolar arc capable of producing breakdown sites with high enhancement factors. We have attempted to produce a self-consistent picture of triggering, arc evolution and surface damage. We model these mechanisms using Molecular Dynamics (mechanical failure, Coulomb explosions, self sputtering), Particle-In-Cell (PIC) codes (plasma evolution), mesoscale surface thermodynamics (surface evolution), and finite element electrostatic modeling (field enhancements). We will present a variety of numerical results and identify where our model differs from other descriptions of this phenomenon.

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