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Modeling of vacuum arcs with liquid-metal cathodes[1] DMITRY LEVKO, ROBERT ARSLANBEKOV, VLADIMIR KOLOBOV, CFD Research Corporation — Vacuum arcs are multi-phase phenomena associated with melting, evaporation and ionization of electrode materials. In this paper, we will present simulations of vacuum arc ignition from the tip of a Taylor cone on the liquid cathode surface. The formation of Taylor cone on liquid InGa surface is simulated using the volume-of-fluid approach with adaptive Cartesian mesh. We analyze the conditions of the Taylor cone formation and the ejection of liquid droplets from the Taylor cone tip in electric fields. The ignition of an arc discharge is due to the field emission of electrons from the Taylor cone tip and electron-induced ionization of InGa vapors near cathode surface. This stage is considered as a precursor for explosive electron emission from the tip of the cone. We investigate the transition from the field emission to the explosive electron emission. We analyze how the plasma generation and ejection of droplets influence the dynamics of the liquid electrode. The results of our simulations are compared with the available experimental data [1]. [1] D. I. Proskurovsky, Explosive Electron Emission from Liquid-Metal Cathodes, IEEE Trans. Plasma Science 37, 1348 (2009). -/abstract- Supported by DoE SBIR Phase II Contract: DE-SC0015746 Sorting category 2.14 Thermal plasmas: arcs, jets, switc

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