

Computational Efficiency for Kinetic Simulation of Vacuum Arcs

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The spatial, temporal, and model capability demands for simulating vacuum arc discharges are enormous. The simulation must evolve from an initial collisionless vacuum (or near vacuum) state through a sputtering phase with surface interaction and low collisionality and ionization, into a growing quasi-neutral plasma with increasing collisionality and ionization, to an explosive growth electron avalanche process, and finally to a steady current-carrying arc plasma. The modeling demands change drastically as each of these phases is encountered. We describe a number of model advances to address these challenges.

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