

## Particle-in-cell simulation of vacuum arc ignition and development

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A full arc cycle (ignition-growth-steady-state-extinction) is simulated using the particle-in-cell (PIC) code ArcPic2D.

The model features electrons, singly charged ions, and neutrals which are tracked in a rotational symmetric geometry with 2 position components and 3 velocity components between two parallel plates.

Modelled interactions are long range electrostatic fields (PIC), coulomb collisions, elastic collisions e-Cu, charge exchange, and impact ionization. The surface model includes Fowler-Nordheim (FN) electron emission, Yamamura-Tawara sputtering and heatspike sputtering, single electron yield, and neutral evaporation. The circuit is a small capacitor which depletes from the current in the arc. Using this model, we are able to show a qualitatively correct ignition and development of a vacuum arc copper plasma, and are predicting the conditions on and above the surface during a breakdown.

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