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Modeling and simulation of high current flowing through a vacuum arc interacting with electrodes and shields KAI HENCKEN, JOSCHUA DILLY[1], ABB Switzerland Ltd., Corporate Research — Constricted vacuum arcs are typically found in specific vacuum interrupter types at high total currents. Such arcs are metal vapor arcs fed by the evaporation of material from the electrodes. In order to improve the performance of these breakers CFD simulations are an important tool. For a realistic simulation the conditions at the interface between the plasma and the electrodes are essential. This is the case especially at the arc roots, where high current densities occur. Here the microscopic processes of electron- and ion-flow into and out of the metal surface need to be taken into account; on the other hand the macroscopic current distribution is influenced by the current-voltage characteristic of this interface. In this contribution we present the physical model underlying the system of equations used for the plasma-electrode interface. In a second step these are implemented as boundary conditions for a simulation of the electric current distribution using a finite element approach. This is used as the basis to perform simulations of an vacuum arc interacting with a metal shield. A commutation of the current as a function of the surface temperature is found.

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