PROPERTIES OF VACUUM ARCS GENERATED BY SWITCHING RMF CONTACTS AT DIFFERENT IGNITION POSITIONS

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ABSTRACT

Radial magnetic field (RMF) contacts are widely used for the control of vacuum arcs at high currents. The self-induced magnetic field from the flow of the current through the contact structure drives the arc motion, reducing the thermal load on the contact surfaces. The initiation behavior of the drawn arc can affect the arc motion, and thereby the performance of the contacts. This contribution reports on the influence of the arc ignition position on the behavior and properties of switching arc between the RMF contacts. An AC current pulse with a peak value of about 28 kA and frequency of 50 Hz is used. Electrodes were made of Cu-Cr. Defined ignition positions were mechanically created on the cathode surface, with optical confirmation. Besides the arc current and voltage measurements, various optical diagnostics were used. Two high-speed cameras equipped with narrow-band filters characterized the arc behavior, which distinguished the emission of atomic, and ion copper lines. The anode activity was observed by an additional high-speed camera. Near infrared radiation (NIR) spectroscopy determined the anode surface temperature after current zero crossing. In addition, the density of neutral chromium vapor close to the current zero crossing was measured by means of broadband optical absorption spectroscopy. Three Cr I resonance lines at 425.43 nm, 427.78 nm, and 428.97 nm are used for the analysis. The results show clear influence of initial arc position on anode temperature and Cr density.

Primary = Vacuum Interrupters and Spark Gaps
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