Influence of Inductance on the Arc Evolution In AgMeO Electrical Contacts

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Abstract- Three consecutive stages of arc evolution (anodic loss stage, compensation stage and cathodic loss stage) with influence of inductance on the phenomena in opening $AgCdO$ contacts are considered. The mathematical model is based on the measured arc and voltage dynamics and differential equations for electrical circuit, heat equations for electrodes and arc, power balance on anode and cathode surfaces and equations for near-electrode zones. It describes non-stationary temperature fields in anode, cathode and arc column with transition from the metallic arc phase to the gaseous one. The dependence of bridge and arc duration on inductance is discussed theoretically and verified by experimental data. The duration of gaseous arc phase is found dependently on the value of the inductive time constant, while duration of metallic phase depends on inductance weakly. It is shown that dynamics and direction of material transfer during arcing are conditioned by redistribution of cathode and anode temperature and evaporation losses in the course of arc evolution. They depend also on the value of opening velocity. Heat fluxes entering the anode and cathode as well as the rate of material evaporation from each electrode are found as functions of above mentioned phenomena. It was found also that in low current circuits with high inductance arc-to-glow transition occurs, which being controlled can decrease arc duration and erosion.