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NON-MONOTONY OF THE VOLT-AMPERE CHARACTERISTICS OF THE ARC DISCHARGE CAUSED BY EFFECTS OF HEAT CONDUCTIVITY

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Abstract

The interrelation of electrical and thermophysical properties of the electric arc plasma in air with an admixture of vapors of electrode materials at the local level are analyzed in this paper. The numerical solution of the Elenbaas-Heller energy equation for the arc channel is the basis for this consideration. The detailed functional temperature dependences for the electrical and thermal conductivity coefficients of this plasma, which are included in this equation, are convenient for practical applications. As the electrical conductivity coefficient is sensitive to the vapor content of the electrode material, their relationship is established also. It is shown that due to the nonmonotonicity of the dependence of the coefficient of thermal conductivity on

temperature, in turn, the nonmonotonicity of the dependence of the electric field in the arc discharge from the current may arise. The results of numerical simulation are compared with the experimental data. References 18, figures 5, table 1.

Key words: electric arc, Elenbaas-Heller equation, volt-ampere characteristic , copper-air plasma, coefficients of heat and electric conductivity.

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