

Study of the dynamics of arc length regulation of an arc furnace based on the fuzzy impedance-admittance law

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An electromechanical system (EMS) for adjusting the arc lengths of an arc furnace (AF) using a fuzzy model for the electrodes movement control is proposed. A fuzzy impedance-admittance law to form the electrical mode (EM) mismatch signal is created and the use of a fuzzy corrector for the electrode motion control signal is validated. A parametric synthesis of the fuzzy corrector based on the Tkagi-Sugeno model and a structural scheme were developed to implement the fuzzy impedance-admittance law of EM mismatch signal formation. A Simulink model of the developed EMS for fuzzy control of AF arc lengths was created. Simulation and comparing the control performance of deterministic and random disturbances using the proposed EMS structure and a typical arc power controller of the DSP-200 arc furnace were carried out. The analysis showed an improvement in the dynamics and energy efficiency using EMS with the developed fuzzy system engineering solutions in comparing with the performance of a serial arc power controller of the ARDM-T-12 type for the DSP-200 arc furnace.

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