Research on the dynamic calculation model for a DC solenoid electromagnetic contactor and its contact characteristics in break process

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Abstract—DC solenoid electromagnetic contactor is widely used in electrical vehicles, airplanes, trains and other 270v high voltage DC power supply system. Due to its special working environment, the limitation of the volume and weight of the contactor is strict. This requires the contactor to have excellent shock absorption and breaking capacity. The static electromagnetic calculation model of one type of solenoid contactor is established using the finite element method (FEM). Then the dynamic numerical calculation model of the contact and spring system is established and further combined with the solenoid dynamic electromagnetic characteristics. The Runge-Kutta method is adopted to solve the dynamic differential equations, and the dynamic calculation results are compared with the test data. The validity of the model is verified. Using this model, the dynamic characteristics of the electromagnetic mechanism under different spring parameters are analyzed.

Keywords—component; Dynamic model; FEM; solenoid electromagnetic contactor; Contact Movement