SIMULATION OF ARC SHAPE AND VELOCITY CHARACTERISTICS IN A ROTATING ARC GAP SWITCH*

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Simulation is an effective way to investigate the arc motion characteristics which driven by magnetic force. A chain model is employed to describe the arc motion in a rotating arc gap switch which controlled by axial magnetic field. The arc is assumed to be a chain of small cylindrical current elements like a string of beads, and they are linked by a certain rules. Each element moves individually which determines the behavior of the whole arc. Each element receives Lorentz's force from magnetic field and a fluid drag force from the surrounding gas, the velocity is calculated by the equivalence of them. Magnetic field intensity can be numerically calculated by finite element software. Fluid drag force is determined by gas density, Reynolds number, the diameter and velocity of the column.

The arc behavior and shape are obtained in a simulation example. The surface drag force is investigated and proved to be a significant factor that influences the arc shape and velocity characteristics. The arc column diameter is calculated from the arc velocity measurement results.

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