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Title: Characteristics of Break Arcs Driven by External Magnetic Field in a DC42V Resistive Circuit

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Abstract

Motion of break arcs driven by external magnetic field is observed using a high-speed camera. The magnetic field is applied with a permanent magnet. Experimental circuit is DC42V-10A resistive circuit. Material of electrical contacts is silver. The opening speed of electrical contacts is changed to 5, 10 and 20 mm/s. Following results are shown. The break arcs are driven in the direction according to Lorentz force. The arc duration decreases with decrease of the distance between the electrical contacts and the magnet. When the strength of the external magnetic field at the position of the break arc is lower than a certain value, the effect of the magnetic field to drive the break arc becomes ineffective to shorten the arc duration. The result is explained with a relationship between the motion of break arc and the distribution of the external magnetic field.

Keywords- electrical contacts; break arc; magnetic field, high-speed camera; relay