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Research of a New DC Breaker Based on the Elec-tromagnetic Forming Technology

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In Wuhan National High Magnetic Field Center (WHMFC), a new DC breaker based on the pulsed electromagnetic forming (EMF) technology is developed. The breaker is intended for current interruption in the Battery power supply for protecting the long pulsed magnet. The breaker consists of pulsed magnet (EMF coil), aluminum tube (the main contact of DC breaker) and supporters. The aluminum tube is broken with an electromagnetic repulsion produced by induced eddy current, which is activated in the results of the pulsed magnet powered by capacitor.
First, the aluminum wire electrical explosive DC breaker and the EMF technology are combined. Then, the analytical model based upon the solution of Maxwell is built by the Comsol Multiphysics. And finally, the simulation of the magnetic flux distribution, magnetic force, tube deformation and their interactions is completed. Both simulation and primary experimental results show that the design of the new DC breaker with compact volume and easy maintenance is feasible. In addition to the pulsed high magnetic field facility, the breaker can also be applied to numerical potential industrial fields.

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