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High-Current Arc Discharge (HCAD) Test System for Aeronautic Power

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High-potential DC power distribution systems such as those found in aeronautics are at risk to failures different from AC and low-voltage DC systems. Detection and mitigation of such failures, in conjunction with prevention, are of importance for not only the aerospace field but also to electric vehicles, solar power systems, and data centers.

In collaboration with the Air Force Research Laboratory, APELC has developed a high-current arc-discharge (HCAD) system for test and research applications. The development was driven by the need to understand system failures and related effects specific to high-potential DC-power distribution. The HCAD system is an instantly reconfigurable arc-discharge source capable of driving 50-Amps continuously or more than 1-kA in pulsed-discharge mode. The system can be configured for unipolar or bipolar power up to 600 VDC in both pulsed and continuous modes. The system employs 24 Farads of capacitance for pulsed discharge and uses GTO thyristors to energize and de-energize the load. HCADS features internal current limiting resistors, a hand-held fiber optic remote, calibration fixture, and voltage and current diagnostics. This paper presents the design of the HCAD system.

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