Plasma Opening Switch

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SUMMARY

UCLA researchers in the Department of Physics have developed a plasma opening switch that enables quick diversion of multi-gigawatt pulses to a protective shunt circuit.

BACKGROUND

Opening switches are used in pulsed power applications for signal conditioning, inductive power sources, and thermal management. However, modern switches for pulsed power applications are either fast, simple, or inexpensive; it is difficult to find solutions strong in all three areas. A switch offering all three advantages will have a market advantage over the alternatives.

INNOVATION

UCLA researchers have developed a low-cost, fast, and simple plasma-based opening switch for high power applications. The switch can conduct hundreds of kiloamps of current and open on a microsecond time scale, holding off tens of kilovolt potentials. The design utilizes readily available materials, eliminating long-lead items. Additionally, it requires few parts, enhancing manufacturability while minimizing design complexity.

APPLICATIONS

- Ultrafast laser systems
- Dense plasma focus thermal load management
- Pulsed power systems
- Inductive energy storage
- Pulse conditioning

ADVANTAGES

- Fast circuit switching
- Simple design promotes ease of fabrication and assembly
- Utilizes low-cost commercially-available materials
- Handles multi-gigawatt power applications

STATE OF DEVELOPMENT

Successful technology demonstration in laboratory environment.

RELATED MATERIALS

- N. Majernik, S. Pree, Y. Sakai, B. Naranjo, S. Putterman, and J. B. Rosenzweig, Simultaneous Ultra-Fast Imaging and Neutron Emission from a Compact Dense Plasma Focus Fusion Device, Instruments, 2018.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Method Of Localizing Breakdown In High Power Rf Network

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INVENTORS

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OTHER INFORMATION

KEYWORDS

Shunt, ultra-fast, ultra, fast, ultrafast, laser, imaging, circuit, shunt, pulse, power, thermal, management, dense, plasma, focus, plasma, snubber, switch, interrupter

CATEGORIZED AS

- **Communications**
  - Optical
- **Engineering**
  - Engineering
  - Other
- **Semiconductors**
  - Testing
- **Sensors & Instrumentation**
  - Scientific/Research

RELATED CASES

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