Method Of Localizing Breakdown In High Power Rf Network

Tech ID: 28908 / UC Case 2017-381-0

SUMMARY

Researchers in the Department of Physics have developed a method for detecting localized electrical breakdowns in high power RF networks.

BACKGROUND

Electrical power failures are present in a variety of systems, from transmission lines to aircraft wings, and their early detection avoids damaging breakdowns. Power breakdowns in waveguides, which transmit waves between system components with minimal energy loss, are accompanied by arcing, an electrical discharge producing visible light. Current waveguide arc detectors have aided in the localization of these breakdown events. However, existing technologies cannot perform in situ measurements or locate arcs in complex-shaped waveguides.

INNOVATION

Researchers at UCLA have developed a method for detecting localized electrical breakdowns in a high power RF network. This method simplifies early arc detection in waveguides while reducing costs by not breaking the vacuum and adding components. This approach can also distinguish between longitudinal and transverse sound waves, allowing arc detection in a waveguide that includes bends and other elements (e.g. gaskets).

APPLICATIONS

- Transmission lines
- Radar systems
- Electrical protective systems
- High-frequency protective circuits

ADVANTAGES

- Early detection
- Does not require taking system apart
- No additional components required
- Detection in complex waveguides

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,391,768	07/19/2022	2017-381

RELATED MATERIALS

- A. Cahill, V. Dolgashev, J. Rosenzweig, S. Tantawi, & S. Weathersby. “Ultra High Gradient Breakdown Rates in X-Band Cryogenic Normal Conducting Rf Accelerating Cavities.” 8th Int. Particle Accelerator Conf.(IPAC'17), 2017, 4395-4398.
- A. Cahill, G. Bowden, V. Dolgashev, A. Fukasawa, J. Rosenzweig, & S. Tantawi. “High Gradient S-Band Cryogenic Accelerating Structure for RF Breakdown Studies.” North American Particle Accelerator Conf.(NAPAC'16), 991-994.

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

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OTHER INFORMATION

KEYWORDS

RF power, electrical breakdown, RF waveguide, electric arc, arc locator, sound waves

CATEGORIZED AS

- **Communications**
  - Networking
- **Energy**
  - Transmission
- **Sensors & Instrumentation**
  - Physical Measurement

RELATED CASES

2017-381-0

▶ Plasma Opening Switch

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