

Filter Capacitor Dynamics Based Fault Detection and Time-Frequency based Fault Localization in Low-Voltage DC Microgrid

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ABSTRACT

FILTER CAPACITOR DYNAMICS BASED FAULT DETECTION AND TIME FREQUENCY BASED FAULT LOCALIZATION IN LOW-VOLTAGE DC MICROGRID relates to a system and process of fault detection and fault localization of short circuits comprising of steps such as - data acquisition 11, fault index 12, fault detection 13, fault characterization 14, and fault location and isolation. Present short circuit fault detection system has its use for LV-DCMG, especially for building applications; as well as for detecting both the LIF and HIF SC faults; including cases where there is presence of DGs.

KEY APPLICATION AREAS

- 1.Low-voltage DC (LVDC) microgrids.
- 2.Building energy management systems.
- 3.Smart buildings and distributed energy systems.
- 4.DC power distribution protection.
- 5.Renewable energy microgrids (solar + battery).
- 6.Industrial and commercial DC power networks.

POTENTIAL USE

- 1.Real-time short-circuit fault detection in LVDC microgrids using filter capacitor dynamics.
- 2.Fault localization and isolation to disconnect only the faulty section while keeping the remaining network energized.
- 3Protection of building DC distribution systems powered by solar PV, batteries, and distributed generation (DG).
- 4.Detection of both low-impedance (LIF) and high-impedance (HIF) short-circuit faults

with a minimal number of sensors.

5. Fast service restoration by isolating faults within milliseconds, minimizing downtime in homes, commercial buildings, and industrial facilities.

6. Cost-effective protection systems for scalable DC microgrids without increasing sensing complexity as load branches grow.