

Fault Identification in DC Grids

Short-circuit Fault Identification in DC Distribution Grids

Invention

The proportion of electricity generated by renewable energies is growing steadily, as is the proportion of DC power in the energy consumption. Devices such as computers, small appliances, lighting, motorized devices, or energy efficient fans rely on DC power.



Therefore, the DC distribution technology based on power electronics has great advantages in terms of flexible power control and efficient energy distribution. For DC distribution networks, however, suitable protection techniques that can quickly and reliably detect short circuit faults must be provided. In order to be able to selectively eliminate short circuit faults in the DC Network at the early stage, fast and accurate approaches are needed to identify the faulty line.

In order to identify the faulty line, the second derivative of the line current is investigated. As soon as the second derivative of the current (SDOC) exceeds a threshold value, the 3-level stationary wavelet transform (SWT) is performed on the SDOC. Using the data obtained by SWT a "singularity index" (SI) is calculated. If this SI exceeds a threshold value, the short circuit fault in the monitored line is identified.

Commercial Opportunities

Transmission system operators (TSO), distribution system operators (DSO), wind park owners, photovoltaic park owners, energy storage system owners, DC charging providers, electric vehicle (EV) manufacturers and manufacturers of DC protection devices can use this technology in order to identify faulty lines in DC grids.

Current Status

The system for identifying faulty lines in the DC network was realized with FPGAs (Field Programmable Gate Array) in a test setup. Hardware tests under the real-time simulation confirm the sufficient sensitivity and accuracy of the system and the method. A prototype is available. On behalf of the RWTH Aachen, PROvendis is looking for companies that are interested in further development to market readiness. Apart from the cooperation, licenses can be granted for the invention and the intellectual property rights.

An invention of RWTH Aachen

Competitive Advantages

- no need of communication devices
- existing hardware usable
- adaptive system
- fast and accurate response

Technology Readiness Level

3

Industries

- Power system supplier
- DC charging provider
- Wind and photovoltaic parks
- Electric vehicle manufacturer

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