Early Intermittent Ground Fault Detection for Stators in High-Impedance Grounded Generators

WiSys: T230014WO01

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WiSys is currently seeking licensing partners to implement this technique into protective relay devices for high-impedance grounded generators

The Invention

Researchers at the University of Wisconsin-Platteville have created a technique for detecting stator intermittent ground faults in utility-scale generators. These intermittent ground faults can cause damage to the insulation in the stator and result in significant downtime to the generator if not detected before becoming a solid ground fault. Intermittent ground faults have been difficult to detect through conventional protective relay schemes on the market due to the random nature of the intermittent ground faults, also called "intermittent arcing." Early detection of these intermittent ground faults could allow for identification of the causes of the intermittent arcing before a solid fault shuts down the generator. This invention employs a subharmonic injection scheme to detect intermittent ground faults that can be readily integrated into high impedance grounded generators which use available neutral grounding current. Two levels of detection are employed: an alarm which does not disable the generator capacity and a trip signal to protect the generator. The necessary circuitry needed for the invention, including the circuitry for subharmonic injection, is compatible with circuitry currently used in the 64S scheme, simplifying the adoption of this approach. The algorithm has been tested using data from an offline 618 MVA generator and experimentally using a method developed by the inventor that is included in the patent claims. To our knowledge, there is no firmware which can detect intermittent ground faults of high impedance generators without the implementation of additional current transformers in the protective relay system.

Key Benefits

- Alerts about intermittent ground faults before they become solid ground faults
- Implements into current systems as a firmware update
- Uses two level of detection: alarm and trip
- Employs time delays to help protect against false positive misoperations
- Does not require additional current transformers
- Capable of detecting intermittent ground faults near the generator neutral
- Scheme works whether machine is online or offline

Stage of Development

The algorithm has been tested using data from an offline 618 MVA generator and experimentally using a method developed by the inventor that is included in the patent claims.

Tech Fields

- Engineering : Power electronics & control systems

For current licensing status, please contact Allee Marti at amarti@wisys.org or 608-316-4037

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