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Islanding Detection of Integrated Wind Energy System with Variations in DC Link Voltage

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Abstract:

Renewable energy integration into the grid is growing in everyday life for meeting the universal energy consumption demand. The main difficulty with the integration of Distributed Generation to the main grid is unintentional islanding. It may affect the field persons and equipment involved with it. As per the DG integration criteria, the islanding must be recognized in less than 2 seconds. This paper has, a new passive islanding detection method has been recommended for detecting unintentional islanding using variations in the DC link voltage. The planned technique detects and classifies the non-islanding cases from islanding events when the changes in DC link voltage are more than a predefined threshold value. The simulation outcomes in Matlab/Simulink show the effectiveness of the recommended method at zero power mismatch balanced islanding.

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I. Introduction

Nowadays, due to the continuation of fossil fuels, they are decreasing in day to day life. Hence, the globe is looking towards renewable energy systems. Distributed Generation (DG) refers to the production of electricity from small-scale power generation systems that are close to the point of consumption, rather than from large, centralized power plants that are typically located far away from the consumers. The major advantage of such DG systems is they can increase the consistency and resiliency of the power grid. It can also help to reduce greenhouse gas emissions and improve environmental sustainability, by enabling clean, renewable energy at consumer locations. The major problem with such DG integration to the grid is islanding. Islanding is a phenomenon that can occur when the DG system continues to supply power to a section of the grid during a power outage, even when the rest of the grid has lost power [1]. This can be a safety hazard for workers who may believe that the power has been shut off and can damage equipment if the voltage and frequency of the power being supplied by the DG system are not properly synchronized with the rest of the grid. Islanding detection is a process that is used to automatically detect when an islanding event occurs and to separate the DG system from the grid to prevent further power supply [2]. There are a variety of different islanding detection methods that can be used, including passive methods that rely on changes in passive parameters like voltage and frequency, active methods that inject a test signal into the grid, and monitor the response and hybrid approaches that combine both active and passive methods.

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