شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

HANAA ALY

IMPROVING PROTECTIVE SCHEMES OF DISTRIBUTION NETWORKS AND MICROGRIDS

By

Mohamed Ahmed Hussin Ahmed Dawoud

A Thesis Submitted to the
Faculty of Engineering at Cairo University
In Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

In

Electrical Power and Machines Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Improving Protective Schemes of Distribution Networks and Microgrids

Key Words:

Distributed generation, Microgrid, Coordination, Protective schemes and Rate of change of phasor voltage (ROCOV).

Summary:

The integration of distributed generation to the distribution networks and the wide application of microgrid concept to the existing distribution networks lead to challenges for protection schemes due to bidirectional power flows, unintentional islanding, and the change in short circuit level during different modes of operation or the change in network operating conditions. This thesis proposes three protection strategies to deal with the distribution network and microgrid protective schemes.

The first proposed strategy is a new islanding detection technique based on the production of voltage sequence components at every relay location not only at the DG point of common coupling. Thus, detecting the islanding at all relays provides updating the protection setting for all relays based on local measurement only without need for a communication network.

The second strategy provides a new fault detector based on calculating the rate of change of phasor voltage (ROCOV). It can be able to locate the faulty section using standard inverse-time characteristics and well distinguish between transient healthy and faulty conditions.

The third strategy provides a new protection coordination scheme based on ROCOV. It does not require communications or adaptive protective devices to adapt the setting with any dynamic changes in generations or loads. Further, it is not affected by any topological changes.

The proposed approaches are tested using different networks under wide variations in grid-connected and islanded modes of operation. The extensive test results indicate that the proposed schemes are highly selective and reliable in providing effective protection schemes.

DISCLAIMER

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references sections.

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Date: -- / -- / 2021

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TABLE OF CONTENTS

LIST OF TABLES