بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

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

MONA MAGHRABY

ENHANCING THE PERFORMANCE OF DISTANCE PROTECTION DURING POWER SWING

By

Loai Mohamed Ali El-Sayed

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

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Title of Thesis:

ENHANCING THE PERFORMANCE OF DISTANCE PROTECTION DURING POWER SWING

Key Words:
Power System Stability, Distance Protection, Power Swing Blocking and Unblocking, Phasor Measurement Units (PMUs), High Impedance Faults (HIFs).

Summary:

Power swing is a transient phenomenon arises due to several reasons including line switching, line outage, sudden load increment or decrement, faults, etc. Unnecessary tripping during power swing and unnecessary blocking for faults occurring during power swing result in distance relay mal-operation. This thesis introduced two schemes for supervising distance relays during swings and throughout faults during swings at different fault conditions including high impedance faults. The schemes rely on constructing a locus diagram for the current and voltage differences between the two ends of the protected line using phasor measuring units. The schemes only calculate two mathematical features, the length of semi-major and semi-minor axes for each locus. The applied threshold values for the schemes are calculated depending on the ellipse circumference and the rate of change of ellipse circumference during fast power swing respectively.

The achieved results proved that the proposed schemes are immune to fault inception angles and slip frequencies in different locations of zone-1 and zone-2 of distance relays, while the maximum detection time of the algorithm was 4 ms and with a communication latency of 50 milliseconds using 4G technology. The proposed schemes ensure salient features for detecting fault cases with adequate speed and approved their superiority over conventional algorithms.

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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