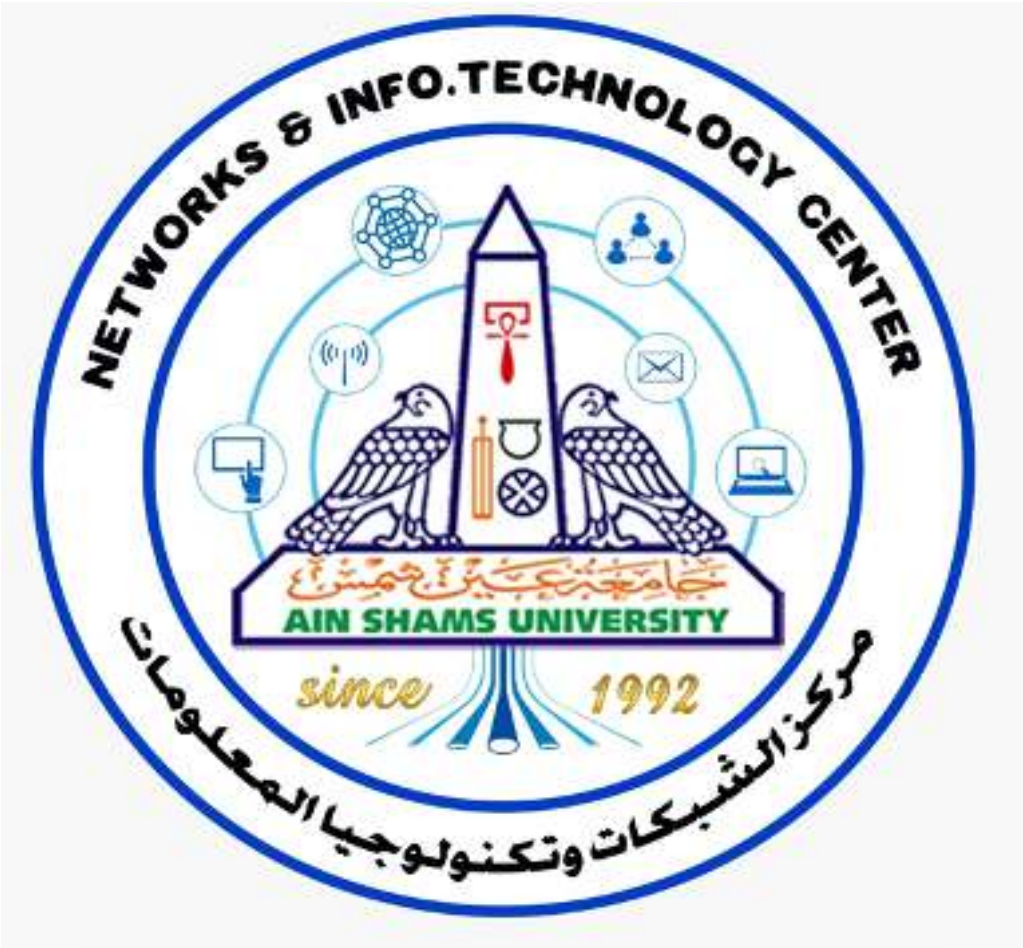
Mona Maghraby

بسم اللّه الرحمن الرحيم

مركز الشبكات وتكنولوجيا المعلومات

قسم التوثيق الإلكتروني



Mona Maghraby

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها

علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

Cairo University

IMPROVING DISTANCE RELAY PERFORMANCE FOR STATCOM-COMPENSATED TRANSMISSION LINES

By

Ali Hussein Hadi Alkhalil

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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Approved by the

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TITLE OF THESIS: Improving Distance Relay Performance for STATCOM- Compensated Transmission Lines.

Key Words: Improved Mho Distance Rely, STATCOM Device, SPMUs, Fault Resistance Estimation, Fault Location Calculation.

Summary:

This thesis proposes a new technique for estimating an accurate apparent impedance in systems equipped with STATCOM device at its midpoint. The main goal of this thesis is to eliminate the impacts of both the shunt current of the STATCOM device and the fault resistance on apparent impedance calculation in order to obtain accurate fault distance. The technique depends on synchronizing phasors measurement units (SPMUs) to transmitted data from the midpoint connection and from the receiving end to the relay at sending end. The fault resistance is mathematically calculated based on active power values at sending and receiving ends. Unlike the published methods, which are valid only if the fault resistance is much larger than the TL resistance, the proposed method is valid whatever the value of fault resistance compared to the TL resistance. Moreover, the proposed method is valid for both ground and phase faults.

The proposed algorithm is extensively investigated on part of a 400 kV, 50 Hz power grid consists two series transmission lines with three generating sources. The STATCOM FACTS device is assumed to be connected at midpoint of line. The achieved results ensure the effectiveness of the proposed method.

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 section.

Name: Date:

Signature:

Dedication:

My dear parents, My lovely Wife, My brothers and My children “Baneen”, “Mustafa” “Taha”, and “Hussein”.

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First, I am obligated to **Allah** for everything; without His blessing, this research would not have been possible, who enabled me to accomplish my studies for the Doctor of Philosophy (Ph.D.) Degree in Electrical Power and Machine Engineering.

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