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

Cairo University

Enhancement of Electric Vehicles Integration in Residential Distribution Sector

By

Galal Fathy Abdelaal Ahmed

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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Under the supervision of

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Title of Thesis:

Enhancement of Electric Vehicles Integration in Residential Distribution Sector

Key Words:
Electric Vehicles, Charging Coordination, Uncoordinated Charging, Home Energy Management, Battery Degradation.

Summary:

Environmental issues and energy crisis encourage the transition of conventional fuel-based vehicles to electric vehicles (EVs). Consequently, the participation of EVs is expected to grow in the existing distribution grids. As this technology is growing up, charging activities of EVs arise as an extra consumption added to the existing load of the distribution network. Accordingly, the uncoordinated charging activities of EVs may lead to an increase in the stress on the distribution networks. Thus, coordination of EVs charging activities is the perfect way to avoid the negative consequences of unscheduled charging activities without reinforcing the existing network infrastructure.

This research is devoted to study and find solutions to the effects associated with EVs integration in residential communities. Proposed solutions are applied in residential communities from two perspectives. The first one is the effect of aggregated home charging activities of the EVs fleet on the whole distribution network in terms of main substation overloading, network power losses, and system voltage deviations. The other perspective is the effect of EV integration on a single house and the relevant effects associated with the charging and discharging processes on the household load demand and total daily energy cost.

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: 1 / 4 / 2021

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DEDICATION

This thesis is dedicated to my beloved children, Omar and Leen I love you all.

This work is dedicated to the soul of Prof. Dr. Fahmy Elbendary. You left great fingerprints of hope on our lives. You shan’t be forgotten.

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