بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / حسام الدين محمد مغربي

بقسم التوثيق الإلكتروني بمركز الشبكات وتكنولوجيا المعلومات دون أدنى مسئولية عن محتوى هذه الرسالة.

ملاحظات : لا يوجد

PROPOSED RANKED STRATEGY OF ELECTRIC VEHICLES CHARGING FOR TECHNICAL AND ECONOMICAL ENHANCEMENT

By

Norhan Mohamed Mokhtar Mohamed

A thesis submitted to the

Faculty of Engineering at Cairo University

In Partial Fulfillment of the

Requirements for the Degree of

MASTER OF SCIENCE

In

Electrical Power and Machines Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Under supervision of

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Title of Thesis:

Proposed Ranked Strategy of Electric Vehicles Charging for Technical and Economical Enhancement

Key Words:

Charging Cost, Coordinated charging, Electric Vehicle (EV), Multi-Objective Function, and Particle swarm optimization (PSO).

Summary:

Car exhaust is one of the most common causes of ozone hole aggravation. Electrical vehicles (EVs) represent a promising solution to avoid this problem. Despite the benefits of EVs, their random charging behavior causes some difficulties regarding the electric network performance, such as increased energy losses and voltage deviations. This thesis aims to achieve the proper scheduling of the EVs charging process, avoid its negative impacts on the network, and satisfy the EVs users' requirements. The EVs charging process is formulated as an optimization problem and solved using particle swarm optimization. The optimization problem formulation considers the EV arrival and departure times and the state of charge required by the user. Different strategies such as separated, accumulated, and ranked strategies with continuous or interrupted fixed charging have been applied to solve the uncoordinated EVs charging problem. These strategies are extensively tested on the modified IEEE 31 bus system (499-node network), using the combination of both Open Distribution System simulator (Open DSS) and MATLAB m-files. The simulation results confirm the effectiveness of the proposed accumulated ranked strategy with interrupted fixed charging in improving the overall power system performance. The achieved improvements include minimizing: the peak power capacity, the peak power losses, and the voltage drop. Moreover, the cost of the EVs charging in most of the feeders has been decreased to a satisfying value. A comparison between the proposed strategy and some previously reported strategies has been performed to ensure the technical and economic enhancement of the proposed strategy.

DISCLAIMER

I hereby declare that this thesis is my 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.

Name: Norhan Mohamed Mokhtar Mohamed Date: / / 2022

Signature:

ACKNOWLEDGMENT

Thanks to ALLAH who gives us the power and hope to succeed.

Thanks must go to Allah the creator of this universe who ordered us to study and explore his creations to know him better. However, as I come to understand more, I find that there is so much more knowledge to absorb and to get to grips with.

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