بسم الله الرحمن الرحيم

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تم رفع هذه الرسالة بواسطة / سامية زكى يوسف

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

ملاحظات: لا يوجد

A NOVEL DESIGN OF FOURTH-ORDER HARMONIC PASSIVE FILTERS FOR ELECTRIC POWER DISTRIBUTION SYSTEMS OPERATING UNDER NON-SINUSOIDAL CONDITIONS

By

Nehad Mokhtar Ahmed Khattab

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
GIZA, EGYPT
2022

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Title of Thesis:

A Novel Design of Fourth-Order Harmonic Passive Filters for Electric Power Distribution Systems Operating Under Non-Sinusoidal Conditions

Key Words:

Damping Filters, Harmonic Distortion, Optimization, Power Quality, Passive Filters.

Summary:

Harmonic resonance is a topic of interest in modern power system networks because it may provide a significant increase in harmonic voltage or current values. As a result, the recent tendency in power quality studies is to develop new resonance-free systems that dampen resonances and reduce harmonics. In this context, the fourth-order damped high-pass passive filter is introduced in this work as a novel filtering technique for electric power distribution systems operating under non-sinusoidal conditions, including the injected current harmonic distortion of industrial consumers, as the optimal design is obtained based on different design objectives. The filter's performance has been examined using a single objective (total demand distortion) and a group of multi-objective functions (total demand distortion of harmonic currents, a parallel resonance index, and filter cost), while maintaining the individual and total harmonic distortion limits stated in IEEE Std. 519. A comparative analysis of the different damped filters is presented to assess the proposed filter performance. Filter design success has been confirmed by the outcomes. The filter has been proven to work with multi-pulse variable speed motors and with different short-circuit capacity systems.

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.

Name: Nehad Mokhtar Ahmed Khattab Date: -- / 7/ 2022

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