GENERALIZATION AND CONTROL OF CHAOTIC SYSTEMS USING EXTRA PARAMETERS AND AFFINE TRANSFORMATIONS

By

Wafaa Saber AbdelHalim 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
Engineering Mathematics

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Generalization and Control of Chaotic Systems Using Extra Parameters and Affine Transformations

Key Words:

Fractional dynamics; Hidden attractors; Image encryption; Non-autonomous control; Switched synchronization

Summary:
Generalized scaled, reflected, rotated, sheared and/or translated chaotic attractors are generated via extra parameters and affine transformations. Reproducibility rules are set and potential applications of the implementation sensitivity property are discussed. Distributed self-reproduced attractors on an arbitrary trajectory are generated through dynamic parameters. A nontraditional multi-character chaotic writer is introduced. The proposed generalized chaotic systems are verified experimentally and exploited successfully in simple and synchronization-dependent ciphers.

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: Wafaa Saber AbdelHalim Sayed Date:

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Dedication

To my beloved mother, Taragy, for her invaluable support. I could not have accomplished any success without her continual efforts.

To my beloved younger brother, Ahmed, who is a source of inspiration and a motivation for success.

To my sister by heart, not blood, my best friend forever Shaimaa Samir.

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