



Palestine Polytechnic University
Deanship of Graduate Studies and Scientific Research
Master of Mathematics

Conformable Fractional Differential Operators With Applications

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M.Sc. Thesis

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Conformable fractional differential operators with applications

Submitted by:

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Supervisor

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M.Sc. Thesis

Submitted to the Department of Mathematics at Palestine
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degree Master of Mathematics

The undersigned hereby certify that they have read, examined and recommended to the Deanship of Graduate Studies and Scientific Research at Palestine Polytechnic University the approval of a thesis entitled: **Conformable Fractional differential Operators With Applications**, submitted by **Hala Khaled Abd Alrahman Alama** in partial fulfillment of the requirements for the degree of Master in Mathematics.

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I declare that the Master Thesis entitled "**Conformable Fractional differential Operators with applications**" is my original work, and hereby certify that unless stated, all work contained in this thesis is my independent research and has not been submitted for the award of any other degree at any institution, except where due acknowledgment is made in the text.

Hala Khaled Abd Alrahman Alama

Signature: _____

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Dedication

To my parents,

To my husband

To my brothers and sisters.

To my Friends and my students.

Hala Khaled Alama_____

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Abstract

A fractional differential operator D^α has a conformable property if $D^\alpha(t) \rightarrow f'(t)$ when $\alpha \rightarrow 1$. So fractional calculus is a generalization of the classical one. Hence many results and properties in classical calculus are studied and generalized in the fractional case.

In this thesis, we study many fractional derivatives that are based on the limit definition, and in particular conformable fractional derivative is considered as it is the most popular definition used in the literature. Its main results and properties are reviewed and summarized. In addition, many applications for different types of fractional differential equations are provided.

Moreover, we study three specific fractional differential operators. In particular, the UD-fractional derivative, the Exponential fractional derivative, and the Hyperbolic fractional derivative are introduced. In each one, the main properties and results are investigated and proved. As applications, various kinds of fractional differential equations based on these fractional operators are considered and solved.

DEDICATION

This thesis is dedicated to:

The sake of Allah, my Creator, and my Master,

My great supervisor Dr. Iyad Alhribat, who encourage and support me,

My external committee member,

My parents, are the reason for what I become today.

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