

## **Dedication**

*Dedicate this work to*

*My beloved Parents*

*Brothers , sisters*

*And friends .*

## **Acknowledgements**

All praise to “ Allah “ the lord of world , the Almighty , with whose gracious help it was possible to accomplish this wok may prayers and peace be upon Mohammed the last of Messengers .

I would like to express my deep appreciation and gratitude to my supervisor Dr. Blegies Abed Elazeez for her patient guidance and her generous support and encouragement and Also I want to thanks our families and colleagues .

## الخلاصة

هذا البحث يهتم بالرواسم التحليلية الحرة وهي عبارة عن نظائر حرة لدوال تحليلية كلاسيكية في عدة متغيرات معقدة وهي تعرف بأنها ليست بينها علاقة لذلك يقال لها بأنها ليست تبديلية تتضمن الرواسم التحليلية الحرة كثيرات الحدود التي يتم تقييمها عن طريق المتجهات و التي تشكل النوع الرئيسي من الرواسم كذلك من اهتمامات هذا البحث تحليل المتغيرات ذات الدرجات العليا التي تتصف بنفس الصفة (غير التبديلية) وحاصل قسمة الفرق علي كثيرات الحدود غير التبديلية واشتقاق حاصل قسمة الفرق علي الدوال التامة (C) التي فيها المركبة تستبدل بجبرا باناخ .

## **Abstract**

We show concerns analytic free maps . These maps are free analogy's of classical analytic functions in several complex variables , and are defined in terms of non – commuting variables amongst which there are no relations – they are free variables . Analytic free maps include variables with the highest degree of non commutatively pose many difficult problems , the free difference quotient We discuss the difference quotient derivation on homomorphic functions , in which the component is replaced by a Banach alagebra .

## Table of contents

<b>Content</b>	<b>page</b>
Dedication	I
acknowledgments	II
Abstract	III
Table of contents	IV- V
Introduction	VI
Chapter (1) section(1)	
Non-commutative sets and domains	1
Free mappings	3
A proper free map is bianalytic free	8
LMI domains	16
Example of non existence of abianalytic self map on an NCLMI domain	19
Section (2)	
Bounded real lemma	22
Preliminaries on structured non.commutative	26
Bounded real lemma for structured non.commutative multidimensional linear systems	40
Theorem (strict bounded real lemma )	45
Chapter (2) section (1)	
introduction	51
Preliminaries on QDQ rings	52
More core presentation	55
Reduction of multivariariable QDQ rings	56
The full B-resolvent	61
Proposition	62

Section (2)	
The QDQ rings of scalar fully matricial analytic function	68
Dual positivity in A	81
The full resolvent transform	82
Chapter three . section (1)	
Introduction	91
Preliminaries	92
The grassmannian completion	93
Grassmannian resolvents and resolvent sets	99
More on the fully matricial offline space	120
The grassmannian involution	133
Dual positivity	145