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University college of Aljamoum
Department of Mathematics

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METRIC AND NORMED SPACES

A graduation project submitted to the Department of Mathematics by

1. Muhamad Al-Asmari	**2. Jihad Alsaadi**	**3. Muhannad Alsaadi**
4. Sultan Al-Otaibi	**5. Muhamad Al-Harbi**	**6. Masoud Al-Lihyani**
7. Faisal Al-Harbi	**8. Abdullah Al-Juhani**	**9. Mishary Alsaadi**
10. Khaled al-Sharif	**11. Abdulaziz Al-Qurashi**	**12. Ziad Al-Salami**
13. Muhamad AlSuwaihri		

Supervisor

Dr. Tamer Elsaman

Jury

Name	Title
Dr. Hawete Hattab	**Associate Professor**
Dr. Faheem Farrag	**Assistant Professor**

Academic Year 2020-2021

ABSTRACT

In the present project we will study some of the main properties and important examples and theories of metric spaces and complete metric spaces. Also, we will introduce the concept of the normed space and Banach and give some examples of them.

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FREDHOLM INTEGRAL EQUATIONS

A graduation project submitted to the Department of Mathematics by

1-Lamia Al-Lehyani **2-Abrar Al-Luqmani**
3-Nouf Al-Otaibi **4-Lina Al-Mutairi**
5-Sara Al-Otaibi **6-Asrar Al-Saiari**

Supervisor : **Dr. Maryam Aljadani**

Jury

Name	Title
Dr. Fadhel Jeday	Assistant professor
Lect. Amal Almatrafi	Lecturer

Academic year 2020-2021

ABSTRACT

This research deals with the study of Fredholm integral equations and their solutions and getting to know them from their basics. Integral equations are crucial in many applications and therefore, it is necessary to define the integral equation in mathematics. This research project presents a brief introduction to integral equations and integral differential equations and their basic concepts. Furthermore, the Adomian decomposition method and modified decomposition method are used to find the solution of Fredholm integral equations. The Adomian decomposition method and modified decomposition method are two semi-analytical methods that provide approximate analytical solutions of integral equations. Moreover, the direct computation method and the Series Solution Method are used for solving Fredholm integral differential equations. Finally, the method for transforming the boundary value problem into an equivalent Fredholm integral equation is discussed. All the techniques in this research have important role applications in physical, chemical, and biological studies and engineering applications.

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Introduction to Heat Equation

A graduation project submitted to the Department of Mathematics by

1- Ahmad Fahad Alluqmani

2- Waleed Atia Al-Mabadi

3- Turki saleh ALbeshri

4- Abdulrahman Naji Al-Bishri

5- Naif Rabea Aali AlSharif

6- Enad Mohisen Al-Yazidi

Supervisor : Dr. Fadhel Jday

Jury

Name	Title
Dr. Fahim Abbas	Assistant Professor
Dr. Hawazen Al-Zahrani	Assistant Professor

Academic year 2020-2021

Abstract

The heat equation theory was first developed by Joseph Fourier in 1822 with the aim of modeling how a quantity such as heat diffuses through a given region.

In this work we give an introduction to this type of thermal diffusion problem by simple examples.

In the first chapter we start with a simple physical problem to explain

- The use of equivalent partial differential equations (EDP) to model the problems of heat flow and diffusion.

- The physical meanings of the frontier and initial conditions.

In the second and third chapters, we present some analytical and numerical methods to solve the heat equation.

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Introduction to wave equation

A graduation project submitted to the Department of Mathematics by

1- Imad Radhy Almagaty

2- Nawaf Khalaf AlOmary

3- Mohamed Ali AlAsmary

4- Ramzi Ahmed AlZahrany

5- Ali bakhit AlZahrany

6- Assem Abed AlWaheed AlHarby

Supervisor: Dr. Fadhel Jday

Jury

Name	Title
Dr. Tamer ElSaman	
Dr. Adel Alotaibi	

Academic year 2020-2021

ABSTRACT

In mathematics, a partial differential equation (PDE) is an equation which imposes relations between the various partial derivatives of a multivariable function. A partial differential equation is simply an equation that involves both a function and its partial derivatives. In this work, we are mainly concerned with techniques to find a solution to the wave equation in its various guises, and to ensure good properties to that solution. That is, we are interested in the mathematical theory of the existence, uniqueness, and stability of solutions

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Applications in Electromagnetic Field Theory

A graduation project submitted to the Department of Mathematics by

Hadeel Abdulmohsen ALMuoqati

Shroog Hussin AL-Askri

Raghad Ahmad Al-Maabadi

Rana Abdrabbo Al-Harbi

Muzinah mohammed

Supervisor

Dr. Azza Soliman

Name	Academic rank
Dr. Mohamed Abdelsabour Fahmy	**Associated Professor**
Dr. Manal Abdulaziz Alhomieyed	**Professor Assistant**

1441-1442

2020-2021

Abstract

In this work we present the basic equations and the laws of electrodynamics and magnetism and search for their properties that explain the basic aspects of electromagnetism.

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Basic Vibration Theory

A graduation Project submitted to

Mathematics Department

By

Wedian rezeeq allqmani

Abeer salem alsulami

Shouq abdulaali aljuhani

Atheer Faisal alhabi

Ahlam judallh alsulami

Supervisor

Dr. Azza Soliman

Examiners Committee	Title
DR. MOHAMED ABDELSABOUR FAHMY SELIM	**Associate Professor**
DR. MANAL ABDULAZIZ SULIMAN ALHOMIEYE	**Assistant Professor**

1441-1442

2020-2021

Abstract

In this project we are going to talk about Free vibrations and. Consider the model multi-degree-of-freedom (MDOF) system we'll state a principle of virtual work and proof it, state a D'Alembert's principle and proof it and state a kinetic energy , proof it and giving an example of it.

We'll talk about the potential energy and types of potential energy: Gravitational potential energy potential and Elastic potential energy of a Spring then Use Lagrange's equation to derive the equation of motion, When studying vibration and its behavior in a state members It was the same vibration the vibration equation was applied directly in homogeneous parts, then we deduced a mathematical equation describing the movement of vibration, and then we studied vibration in members which is cut into a rectangle.

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Applications in finite element Method

A graduation Project submitted to

Mathematics Department

By

Ghadi .Alharbi

Waad .Alharbi

Amani Madani

Malak. Al harthi

Nawader. Muetad

Supervisor

Dr. Azza Soliman

Examiners Committee	Title
Dr. Fadhel Mohammed Mosbah Jday	Professor Assistant
Dr. Maryam Hammad Aljadani	Professor Assistant

1441-1442

2020-2021

Abstract

Finite element analysis has become established as a powerful method or, more correctly, a family of methods - for the spatial approximation of systems of partial differential equations and variational problems. It finds application in a multitude of areas in the engineering and natural sciences, and beyond. The method has a sound mathematical foundation, and contemporary developments span the spectrum from problems concerned with the construction and analysis of stable, convergent methods, to those directed at specific applications. also, when studying Applications in finite element Method, we deduced a mathematical equation describing Integral Equation, and then we studied Beam Elements which is Longitudinal Stress and Strain. Linear Elasticity with Boundary Elements and their representation in form of equations. and study the fundamentals, origins, types, and properties of gears, and to analyze the finite elements of gears and solutions for different stress gauges and gears in the Green's breed. The aim of this talk is to provide an overview of the finite element method with the focus on formulations, their analysis, properties, and various applications.

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Knots theory and applications

A graduation project submitted to the Department of Mathematics by

1-Amjad salem AL_radady 2-Osama Hamadi AL-luhaybi 3 -Abdulrahman Mohammeb AL- otaibi

4 -Ibrahim saleh alharbi 5 -Ziyad Ibrahim alharbi

6-Mutlaq Abdullah Al-Otaibi

Supervisor: Dr Hawete Hattab.

Jury

Name	Title
Dr Badr Alharbi	Assistant Professor
Dr Alanoud Sibih	Assistant Professor

academic year 2020-2021

ABSTRACT

In this project, we introduce the multifarious aspects of theory of knots. We shall, in a straightforward manner, explain the various concepts that form this theory of knots. Throughout this project, we shall concentrate on examples that conduit the understanding of this theory by the reader. We end this project by an application in biology.

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Super linear algebra and applications

A graduation project submitted to the Department of Mathematics by

1- Ahmed saad Alharbi. **2- Basil Masoud Alsaedi.**
3- Faisal Turki Allheabi. **4- Abd Al-Ilah Yahya Al-Hilali.**
5- Ahmed Jamil Al-Lahiani. **6- Sultan Fawzi Al-Harthy.**

Supervisor: Dr Hawete Hattab.

Jury

Name	Title
Dr Badr Alharbi	Assistant Professor
Dr Alanoud Sibih	Assistant Professor

academic year 2020-2021

ABSTRACT

In this project, we introduce the notion of Super linear algebra. The main objects of study are super vector spaces and the linear transformations between them. We have discussed in this project the basic definitions of super linear algebra, super matrix, super fuzzy matrix and lastly mathematical models for solving social problems.

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SOME APPLICATIONS OF DIFFERENTIAL EQUATIONS

A graduation project submitted to the Department of Mathematics by

1. Khalid Hamoud Alqahtani

2. Yazeed Ali Alahmari

3. Mohammed Ibrahim Asiri

4. Tariq Abdulaziz Alasmari

5. Mohammed Ayed Alsilmi

6. Mohammed Manawir Aljahdali

Supervisor: Dr. Fadhel Jday

NAME	TITLE
Dr: Fahim Abbas	Assistant Professor
Dr: Hawazen Al-Zahrani	Assistant Professor

ABSTRACT

Differential equations are used to mathematically formulate, and thus aid the solution of, physical and other problems involving functions of several variables, such as the propagation of heat or sound, fluid flow, elasticity, electrostatics, electrodynamics, etc.

In this work we present in the first chapter an introduction to the differential equation and in the second, we present the most known applications, such as Torricelli's Law for Draining, Population Models, A Swimmer's Problem and Predator-Prey**.**

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VOLTERRA INTEGRAL EQUATIONS

A graduation project submitted to the Department of Mathematics by

1- Rawan Asiri
2- Basma Al-Harbi
3- Emtenan Al-Bashri
4- Hind AL-Harbi
5- Methaiel Al-Otaibe
6- Ruba Al-Harbi
7- Shemoe Al-Moabdi

Supervisor : Maryam Aljadani

Jury

Name	Title
Dr. Fadhel Jeday	Assistant professor
Lect. Amal Almatrafi	Lecturer

academic year 2020-2021

ABSTRACT

This research aims to investigate different methods for solving Volterra integral and integro-differential equations. Introductory concepts of integral equations will be presented. The conversion from initial value problem to Volterra integral equation will be discussed. This conversion can be helpful, especially when solutions of the corresponding integral equations are easier to determine than those for the corresponding differential equations. The successive approximations method will be applied to solve Volterra integral equations of the second kind, and the series solution method is presented to solve Volterra integral equations of the first kind. Finally, the Laplace transform method is used to obtain the solution of Volterra integro-differential equations of the second kind. The variational iteration method is introduced to solve the Volterra integro-differential equations of the first kind.

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Introduction to ordinary differential equations of first-order and second-order

A graduation project submitted to the Department of Mathematics by

1- MOHAMMED AESH ALMABADI	4- Mohammed jameel suliman alhazmi
2- KHALID FAHAD DAKHIK ALAHMADI	5- Ahmed Safar Al-Zahrani
3- YAZEED KHALED DAKHEL ALSAEDI	6- Aali Mahya Alotaibi

Supervisor : Mohamed Abdelsabour Fahmy

Jury

Name	Title
Mansour Elsayed	Assistant professor
Azza Soliman	Assistant professor

academic year 2020-2021

ABSTRACT

The main aim of this project is to discuss the first-order differential equations and linear second-order equations through definitions, concepts, theories and some examples. In the first-order differential equations, we discuss the homogeneous, Bernoulli, and Riccati equations. then, in the linear second-order equation, we discuss the constant coefficient case, the nonhomogeneous case, spring motion and Euler s differential equation

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Introduction to Laplace transform and series solutions for ordinary differential equations

A graduation project submitted to the Department of Mathematics by

1- ABDULLAH SALEM ALAMMARI	4- Mohammed fahhad Ibrahim aldoseri
2- SULTAN JAMAAN ALHARBI	5- MOHSEN GALE ALSWAHRE
3- TURKI NAIF ALSHARIF	

Supervisor : Mohamed Abdelsabour Fahmy

Jury

Name	Title
Mansour Elsayed	Assistant professor
Azza Soliman	Assistant professor

academic year 2020-2021

ABSTRACT

The main aim of this project is to discuss the Laplace Transform, Series solutions and Approximation of Solution through definitions, concepts, theories and some examples. In the Laplace transform, which is a chapter 1, we discuss the solution of initial value problems, shifting and the Heaviside function, convolution and solution of systems. Then, we discuss the power series solution and series solutions in Chapter 2. In the approximation of solution which is a chapter 3, we discuss the direction fields, Euler's method and Taylor and modified Euler methods.

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INTRODUCTION TO DIFFERENTIAL EQUATIONS

A graduation project submitted to the Department of Mathematics by :

1-Waleed Reezg AlSobhy

2-Mohamed Abed Allah AlZahrany

3-Abed AlAziz AlGhameedy

4- Nacer Fahd AlSoulamy

5- Mikhled Atya Alsoulamy

Supervisor: Dr. Fadhel Jday

Jury

Name	Title
Dr. Tamer AlSaman	
Dr. Adel Alotaibi	

Academic year 2020-2021

ABSTRACT

The aim of this work is to introduce and motivate partial differential equation and ordinary differential equation; we give also some classical methods for finding solution of differential equations.

In third chapter we give a result of existence and uniqueness of the Cauchy problem using the Cauchy-Lipshitz theorem, local and global version.