

DEDICATION

... To My parents

To My brothers, Sisters, and

... Lovely Friends

ACKNOWLEDGMENT

Firstly I specify my great thanks to my God for his benefits, facilities, and properties which cover me, then I want to thank deeply Dr.

Mohamed Hassan Mohamed Khabir for his great help in all steps of .this research in spite of his great responsibility

I wish to thank Sudan University of Science and Technology,

.Faculty of Science for the M.Sc chance

Lastly my thanks are due to everyone who; asked, encouraged, and

.gave me any help

ABSTRACT

We present in this thesis the cubic B-spline collocation method and its applications to the differential equations. First we have given the derivation of the B-spline method in general. Second, uniform convergence of the method has been discussed. We have applied the method for solving some problems in ordinary and partial differential equations and the numerical results have been compared with the exact solutions.

النتائج

تناولنا في هذا البحث طريقة - ب - اللسينية متحدة الموضعية التكعيبية وتطبيقها على المعادلات التفاضلية. أولا اعطينا الاشتقاق لطريقة - ب - اللسينية متحدة الموضعية بصورة عامة. ثانيا تمت مناقشة التقارب المنتظم للطريقة. لقد قمنا بتطبيق الطريقة لحل بعض المسائل في المعادلات التفاضلية العادية والجزئية وقد تمت مقارنة النتائج العددية مع الحلول المضبوطة.

Contents

Content	Page NO
Dedication	I
Acknowledgment	II
Abstract	III
□□□□□ □□□□	IV
Chapter one	
General Introduction	1
Chapter two	
B-spline Collocation Method For Solving Self-adjoint Singularly Perturbed Boundary Value Problems	3
Introduction-2.1	3
Reduction to the normal form-2.2	4
B-spline collocation method -2.3	6
Derivation for uniform convergence-2.4	17
Numerical results-2.5	22
Chapter three	
Cubic B-spline Collocation Method For Partial Differential Equations	27
B-spline collocation method for one-dimensional-3.1	27

	heat equation	
B-spline collocation method for an one-dimensional-3.2		34
	nonlinear Klein-Gordon equation	
	B-spline collocation method3.3-	40
Conclusion		46
	Appendix A : Program for example 1	47
	Appendix B : Program for example 2	49
	Appendix C : Program for heat problem	51
	References	54