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SOLVABILITY OF NONLINEAR SINGULAR INTEGRAL EQUATIONS

A Thesis Submitted By

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(B. Sc. (1990) Math)

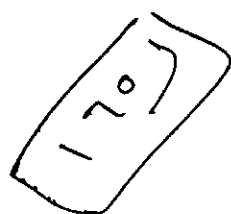
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Abbas Sedky Nagdy

NOTE

This thesis is submitted to the faculty of science, Zagazig university as a partial fulfillment for awarding the degree of master of science in pure mathematics.

Beside the work carried out in this, thesis, the student has attended and passed successfully the following postgraduate courses :

- 1- Functional Analysis.
- 2- Integral Equation.
- 3- Linear Algebra.
- 4- General Topology.
- 5- Differential Equations.
- 6- German Language.

DECLARATION

I declare that this thesis is my own work and it has not been presented for a higher degree of other universities.

Abbas Sedky Nagdy

CERTIFICATE

This is to certify that Abbas Sedky Nagdy Ibrahim has complied with all the requirements for submission of this Master of science to Zagazig university.

Assist. Prof. Dr. MOHAMED HUSSEIN SALEH

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ABSTRACT

ABSTRACT

The Newton-Kantorovich method has been used in many works [3,14,16] to investigate the solution of a nonlinear singular integral equations with Hilbert kernel in case of zero index.

In this thesis we discuss the sufficient conditions for the applicability and convergence of Newton-Kantorovich method to a class of nonlinear singular integral equations in the generalized Hölder space $H_{\phi,m}$ in cases of nonzero indices.

INTRODUCTION

INTRODUCTION

Many difficult problems of modern physics and mechanics may be expressed as nonlinear singular integral equations.

The classical theory of integral equations developed by Fredholm and in recent years the theory of singular integral equations has assumed increasing importance in applied problems.

T. Carleman was the first to give a solution to an important type of singular integral equations in closed form, and this opened the way for the efficient treatment of a wide class of mixed problems of mathematical physics.

The theory of linear singular integral equations has been developed by the fundamental works of many famous mathematicians such as N. I. Muskhelishvili [11], V. G. Ivanitskii [5], F. D. Gakhov [2], I. I. Privalov and others.

Recently the theory of nonlinear singular integral equations has started to develop. The first work in this field was introduced by A. I. Guseinov [3].

One of the effective methods of the approximate solution of nonlinear singular integral equations with Hilbert kernel is the Newton-Kantorovich method.

This thesis consists of two chapters :

Chapter I, is devote to study modulus of continuity and generalized Hölder space. This chapter is divided into three sections.

In section 1.1, we give the definition of modulus of continuity of first and higher orders and its properties which are discussed in [1, 7, 8].