INTRODUCTION

INTRODUCTION

The search of an initial approximation with which the widely known iterative methods converge is considered one of the hardest problems for many authors in solving the different classes of linear integral equations. The difficulty of evaluating the integrals required for the power kernel functions means that the labour involved in computing more than a few iterates is quite prohibitive. The extra labour involved in solving numerically such equations, is the rate of convergence of the modified iterates which is very slow. This means that the new methods are wanted.

The present study deals with the general method for computing the approximate solution and approximate resolvent of linear integral equations of the second kind in the space L_p ($p \geq 1$) for Fredholm, Volterra and the mixed additive integral equations using Dzyadyk's method which is based on the linear polynomial operators of order n. The question of possibly obtaining more precise estimates for the errors which arise in this connection is also investigated. On the other hand, these approximations are discussed in detail for Dirichlet's Vallee-Poussin's, Fejer's, Rogozinski's and Jackson's operators. All these studies are included in four chapters.

In chapter I we review the previous works, auxiliary results, definitions and lemmas, as well as different theorems on the linear integral operator in the space L_p, and some known quantities which are used often and quoted from different resources.

Chapter II, sections 2.1 and 2.2, include the preliminary definitions and lemmas. In section 2.3 we calculate the approximate solution for Volterra integral equation of the second kind in L_p. Section 2.4 deals with the results which discuss in detail, the approximations for Dirichlet's, Vallee-Poussin's, Rogozinski's, Fejer's and Jackson's methods. The main results of this chapter are published in AMSE Review, Vol. 15, NO. 3, 1991, pp.11-28; under the title "AN APPROXIMATE SOLUTION FOR VOLTERRA INTEGRAL EQUATION OF THE SECOND KIND IN L_p".

In chapter III, sections 3.1 and 3.2, include the preliminary definitions and facts, whereas section 3.3 calculates the approximate solution for mixed additive integral equation. In section 3.4 we transform the mixed equation of the first kind to the second kind. Besides, section 3.5 calculates the approximate solution of mixed additive integral equations of second kind by algebraic polynomial.