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Applications of Composite Convolution Operators

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Abstract

The Composite Convolution Operator is an operator which is obtained by composing Convolution operator with Composition operator. Volterra composite convolution operator is a composition of Volterra convolution operator and Composition operator. The Composite Convolution Operators and Composite Convolution Volterra operators have been defined by using the Expectation operator and Radon-Nikodym derivative. In this paper an attempt has been made to investigate applications of Composite Convolution Operators (CCO) in Integral Convolution Type Equations (ICTE). The study may explore a new technique to solve Fredholm Convolution type integral equations and Volterra Convolution type integral equations. Some methods for solving integral convolution type equations by using Composite Convolution Operators have also been studied. For integral convolution type equations, theorems on existence, uniqueness and estimates for solution have also been proved without any restriction for the parameter. In order to determine the solution by the method of successive approximations in this paper, I have made use of the concept of the Resolvent Kernel to obtain Neumann Series. The Banach Contraction Principle has also been used to obtain some results. The method of Variational Iteration has been applied to find out the approximate solution of integral equations by using Composite Convolution Operators. In this paper Numerical Methods have also been adopted for solution of these integral equations. Fourier transform has been used to solve Integral convolution type equations and Laplace transform has been applied to solve Volterra convolution type equations.