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IMPLEMENTATION OF SUMUDU ADM UPON FUZZY LINEAR VOLTERRA INTEGRAL EQUATION - AN APPROXIMATE-ANALYTICAL SOLUTION

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Abstract. In this study, the fuzzy Volterra integral equations' solutions are calculated using a hybrid methodology. The proposed method is based on the Sumudu transform Adomian Decomposition Method (STADM). STADM is more accurate in presenting the precise solution because the problem under consideration has an infinite series expansion-based solution for the unknown function. Using the fuzzy number in parametric form, the fuzzy linear Volterra integral equations are first converted into two crisp integral equations, and the accurate fuzzy solutions are then obtained using SADM. A few instances of the considered equations are solved to show the robustness, efficacy, and application of the established scheme. The results have a big impact on fuzzy analytical dynamic equation theory. By comparing the data in a graphical and tabular format, the robustness of the created regime is verified. Theoretical convergence and error estimates are highlighted for the lower and upper bound solutions are highlighted in this study. The compatibility of the approximated and exact outcomes is tested as well as an acceptable order of absolute error is also fetched in this study.

1. Introduction

The study of fuzzy integral equations is becoming increasingly popular and is expanding rapidly, particularly due to its recently recognized connection to fuzzy control. Since integral equations form the foundation of most mathematical models used to solve real-world problems in various fields, including chemistry, engineering, biology, and physics, a thorough understanding of them is essential. Numerous problems in chemistry, engineering, biology, physics, and other disciplines are modeled and solved using differential equations, and integral equations [1, 4, 8, 14]. It is evident that

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