



A New Combination Method for Solving Nonlinear Liouville-Caputo and Caputo-Fabrizio Time-Fractional Reaction-Diffusion-Convection Equations

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Abstract

In this article, we propose a new combination method called Shehu adomain decomposition method (SADM) to solve nonlinear time-fractional reaction-diffusion-convection equations with Liouville-Caputo and Caputo-Fabrizio fractional derivatives. This method is based on a combination of two powerful methods: the Shehu transform method and the Adomian decomposition method. The advantage of this method is that it is efficient, precise, and easy to implement with less computational effort. Applicability and theoretical results will be demonstrated and enhanced using a numerical example. Numerical results coupled with tables and graphical representations indicate that the proposed method is fully compatible with the complexity of these fractional equations and convenient to handle a various range of other fractional partial differential equations.

Keywords: Nonlinear time-fractional reaction-diffusion-convection equation; Liouville-Caputo fractional derivative; Caputo-Fabrizio fractional derivative; Shehu transform; Adomian decomposition method.