



HOMOTOPY ANALYSIS TRANSFORM METHOD FOR SOLVING TIME-FRACTIONAL NONLINEAR SCHRÖDINGER EQUATIONS USING ATANGANA–BALEANU DERIVATIVE

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Abstract. The Schrodinger equations have various applications in quantum mechanics and physical sciences as they describe a wide range of wave propagation phenomena including dust-acoustic, Langmuir, and electromagnetic waves in plasma physics. In the present article, we introduce the homotopy analysis transform method, which is a hybrid analytic-numeric scheme that combines the Laplace transform with homotopy analysis method. employing the proposed technique, we solve the applications of the Schrodinger equations and analysis the numerical and graphical solutions of considered equations.

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Communicated by Editors; Received June 9, 2025

AMS Subject Classification: 26A33, 34A08, 65H20, 65T60.

Keywords: Fractional Schrodinger equations, Atangana-Baleanu derivative, Homotopy analysis method, Laplace transform.

Throughout the furnished computations, we include a comparison between the approximate values and their corresponding exact solutions, and we evaluate the absolute error. The effectiveness of the proposed method is validated through numerical and graphical simulations, with the results compared to those obtained using other established techniques. The outcome obtained confirms that the suggested approach is an alternative, straightforward, precise, and effective solution for both linear and nonlinear partial differential equations.