Title: Simulation of optical wave propagation of perturbed nonlinear Schrodinger's equation with truncated M-fractional derivative.

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Abstract: This work aims to investigate some novel optical soliton solutions of fractional perturbed nonlinear Schrödinger's equation (PNLSE) with Kerr law nonlinearity. Here, the local derivative is used as the conformable wisdom known as the truncated -fractional derivative. We also deliberated on some assets satisfied by the derivative. To analyze the dynamic conduct of the optical self-control wave pattern of PNLSE, we used a newly effective analytic method, namely the unified method combined with a truncated fractional derivative. For special values of the free parameters, different types of new soliton solutions were obtained such as dark and bright bell soliton, anti-kink and kink soliton, periodic soliton, interaction of periodic and lump soliton, and periodic lump soliton wave solutions that were verified through maple with a three-dimensional plot along with density and a two-dimensional plot. For the manifestation of the effect of fractional derivative, we plotted the three-dimensional graph and also showed the comparative effect in two-dimensional plots along both the x-axis and t-axis. Exploring these single systems creates new opportunities for signal processing and optical communications applications. This technique presents a strong possibility for addressing similar issues in the future. The visualization of several findings demonstrates how the proposed technique effectively constructs solutions with well-understood physical phenomena. When it comes to solving perturbed nonlinear fractional complex equations, the aforementioned method is simpler, more dependable, and more efficient than the others. Both two- and three-dimensional graphs displaying the results will be presented.

Keyword: Unified Method, Perturbed Nonlinear Schrödinger's Equation, Semiconductor Materials, Optical Fiber Communications, Plasma Physics.

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