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NEW JACOBI ELLIPTIC SOLUTIONS OF THE FRACTIONAL (3+1)-DIMENSIONAL NONLINEAR SCHRÖDINGER EQUATION

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This research analyses the fractional (3+1)-dimensional nonlinear Schrödinger equation with Kerr law nonlinearity. This equation characterizes the propagation of attosecond light pulses over a nonlinear optical fibre. The new extended auxiliary equation method is applied to obtain the new Jacobi elliptic function solutions with the aid of the conformable derivative. The proposed method is an effective and more powerful mathematical tool for constructing exact solutions of nonlinear evolution equations. The obtained solutions have degenerated to bright, dark, singular and periodic solitary wave solutions. In addition, the condition for the modulational instability of continuous wave solutions for the equation is generated.

Keywords: Conformable fractional derivative, Jacobi elliptic function solutions Kerr law nonlinearity, Nonlinear Schrödinger equation, New extended auxiliary equation method