A study of fractional HIV-1 infection of CD4+ T–cells of immunodeficiency syndrome with the effect of antiviral drug therapy through non-singular derivative

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Abstract

In this research paper, the HIV-1 infection of CD4+ T-cells fractional mathematical model with the effect of antiviral drug therapy is handled by applying three new computational schemes to this biological model to investigate its analytical explicit wave solutions. This mathematical model is used to predict the evolution of the population dynamical systems involving virus particles. The modified Khater method, the extended simplest equation method, and sech–tanh method with a new fractional operator (Atangana–Baleanu derivative operator) is employing to find the analytical solutions in various distinct new formulas of the biological suggested model. Moreover, the stability of the obtained solutions is investigated by using the characterizes of the Hamiltonian system to show their applicability in making the antivirals that protect our human life. Some plots are explained under specific conditions of the contained constants to reveal the dynamical behavior of the evolution of the population dynamical systems involving virus particles. A comparison between our results and that obtained in previous work is also represented and discussed in detail to show the novelty for our solutions. The performance of the used methods shows power, practical, and ability to apply to other nonlinear partial differential equations.

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