COVID-19 Mathematical Study with Environmental Reservoirs and Three General Functions for Transmissions

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Abstract

In this paper, the ongoing new coronavirus (COVID-19) epidemic is being investigated using a mathematical model. The model depicts the dynamics of infection with several transmission pathways given by general infection functions plus it highlights the significance of the environment as a reservoir for the disease's propagation and dissemination. We have studied the qualitative behavior of the proposed model representing a system of fractional order differential equations. Under a set of conditions on the general functions and the parameters, we have proven the global asymptotic stability of all equilibria by using the Lyapunov method and LaSalle's invariance principle. We also carried numerical results using real-world data to confirm the analytical results we obtained.

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