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Stability analysis of fractional-order SIR model with general incidence rate and treatment

Communication Info

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Abstract

In this work, we study a fractional two-strain epidemic SIR model with a **general incidence rate for both strains**, incorporating treatment for each strain. The proposed model consists of four fractional-order differential equations describing the interactions among susceptible, infected, and recovered individuals. The first part of the mathematical analysis is devoted to proving the existence and uniqueness of positive solutions. The global stability of the model equilibria is established using appropriate Lyapunov functions. Numerical simulations are carried out to support the theoretical results and to illustrate the effect of the fractional-order derivative on the convergence toward equilibrium points. Furthermore, the impact of treatment efficiency on reducing the density of infected individuals for each strain is investigated.

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