

Modeling and Analysis of an SI1I2 R Epidemic Model with Nonlinear Incidence and General Recovery Functions of I1.

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Abstract

In this paper, we established a mathematical model of an S I 1 I 2 R epidemic disease with saturated incidence and general recovery functions of the first disease I 1. Considering the basic reproduction number, we obtained conditions for both disease-free and co-existing cases. The equilibrium points local stability is verified by using the Routh-Hurwitz criterion, while for the global stability, we used a suitable Lyapunov function to analyze the endemic spread of the positive equilibrium point. Moreover, we carried out the local bifurcation around both equilibrium points (disease-free and co-existing), where we obtained that the disease-free equilibrium point undergoes a transcritical bifurcation. We conduct numerical simulations that supported our theoretical findings.