

## Stability Analysis of Fractional SIR Model Related to Delay in State and Control Variables

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### Abstract

The study of a nonlinear mathematical fractional SIR (Susceptible - Infected - Recovered) epidemiological model related to the delay in state and control variables in terms of time is the focus of this paper. The existence of a bounded solution for the fractional SIR epidemic model has been demonstrated, and it is unique. A new set of infection-free equilibrium points has been discovered, and their local stability has been investigated. In addition, using the next-generation matrix method, the basic reproductive number  $R_0$  was calculated.

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