

## IMPACT OF DISCONTINUOUS TREATMENTS ON THE GENERALIZED EPIDEMIC MODEL

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**ABSTRACT.** This paper presents a generalized epidemic model with discontinuous treatment strategies and time-varying delays. Under the concept of Filippov solution, by applying the differential inclusions and the topological degree theory in set-valued analysis, we employ a novel argument to establish new results on the existence of the periodic solutions for the considered epidemic model. After that, we derive some criteria on the uniqueness, global exponential stability of the considered epidemic model and convergence of the corresponding autonomous case of the considered epidemic model, in terms of nonsmooth analysis theory with the Lyapunov-like approach. Our results extend previous works on the epidemic model to the discontinuous cases, some corresponding results in the literature can be enriched and extended. Finally, typical examples and the corresponding numerical simulations have been carried out to support the analytic findings.

### 1. Introduction

During the past several decades, nonlinear dynamical systems described by differential equations with discontinuous right-hand sides have been extensively and successfully applied to various science and engineering fields such as mechanics, electrical engineering, automatic control, etc. In recent years, neural networks with discontinuous right-hand sides have attracted many researchers'

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