ABSTRACT

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The epidemic caused by the recent coronavirus (COVID-19) has attracted the attention of several research areas. Many publications try to obtain answers regarding the dynamics of the spread of the infection since the results of its dissemination have been catastrophic. A systematic method for the analysis and control of the COVID-19 dynamics is an immediate necessity. This work proposes a new mathematical called SIRDQ model considering control laws for the government actions in order to reduce the periods of quarantine. The proposed control laws guarantee the regulation of the basic number of reproduction to a desired value, which is directly related to the propagation of the epidemic model. We consider control strategies based on variable structure systems and sliding modes due to its robustness with respect to parametric uncertainties and disturbances, as found in epidemiological models. The stability analysis of the closed-loop system is rigorously presented. Simulations shows that the employed control strategies assure better levels of isolation to be adopted.

Keywords: COVID-19; Epidemiological Dynamics; Sliding Mode control; Output Feedback.