Differential Game Theory Approach in SIR Epidemic Model

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Abstract: Contagious diseases have always been one of the main threats to human health. These diseases have sometimes spread rapidly amongst a large number of people and have caused deaths among people. Today, due to the control of contagious diseases and lifestyle changes, we are witnessing the transition of diseases from contagious diseases to noncontagious. However, this transition of diseases should not cause to disregard to control of contagious diseases, because by the emergence of drug resistance in pathogens or their carriers, the return of some diseases and by appearance of new diseases has led to more attention to illnesses. Game theory, with its roots in von Neumann and Morgenstern's works during the late 1940's, is the study of multi-player decisions. The differential game is a situation of opposition or cooperation where players choose strategies over time. It is based on the integration of the theory of static games and the theory of optimal control. The science and management of infectious disease are entering a new stage. Increasingly public policy to manage epidemics focuses on motivating people, through social distancing policies, to alter their behavior to reduce contacts and reduce public disease risk. Social distancing practices are changes in behavior that prevent disease transmission by reducing contact rates between susceptible individuals and infected individuals who may transmit the disease. In this article, social distancing refers to the adoption of behaviors by individuals in a community that reduce those individuals' risk of becoming infected by limiting their contact with other individuals or reducing the transmission risk during each contact. Social distancing is an aspect of human behavior particularly important to epidemiology because of its universality; everybody can reduce their contact rates with other people by changing their behaviors, and reduced human contact reduces the transmission of many diseases. SIR is an epidemic model that S, I and R respectively are represented by susceptible, infected and recovered. In this study we use differential game theory approach to model distancing practicing in spread of epidemic. We describe the epidemic with an ordinary differential equation model. In this study we use differential game theory

Keywords: epidemic; infectious diseases; social distancing; maximum efficiency; the basic reproduction number.

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