A BIFURCATION ANALYSIS OF A CONTACT-BASED EPIDEMIC SPREADING

Jordi Villadelprat

Universitat Rovira i Virgili, Tarragona, Catalonia, Spain
antonioe.teruel@uib.es

The dynamics of many epidemic compartmental models for infectious diseases that spread in a single host population present a second-order phase transition. This transition occurs as a function of the infectivity parameter, from the absence of infected individuals to an endemic state. Here, we study this transition, from the perspective of dynamical systems, for a discrete-time compartmental epidemic model known as Microscopic Markov Chain Approach, whose applicability for forecasting future scenarios of epidemic spreading has been proven very useful during the COVID-19 pandemic. We proof that this dynamical system undergoes a transcritical bifurcation, and we prove the local and global stability of the endemic states. This mathematical analysis grounds the results of the model in practical applications.

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