Stability of Explicit and Implicit Discrete Epidemic Models: Applications to Swine Flu Outbreak

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Abstract

In this presentation, we present explicit and implicit discrete epidemic models motivated by the time scales modeling approach. We use these models to formulate the basic reproduction number, which determines whether an outbreak occurs or the disease dies out. We discuss the stability of the disease-free and endemic equilibrium points. Furthermore, we apply our models to swine flu outbreak data to demonstrate that the discrete models can accurately describe the epidemic dynamics. In fact, our comparison analysis shows that the implicit discrete model can best describe the data regardless of the data frequency. In addition, we perform the sensitivity analysis on the key parameters of the models to study how these parameters impact the basic reproduction number.