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A Stochastic Differential Equation SIS Epidemic Model

Abstract

In this talk we extend the classical SIS epidemic model from a deterministic framework to a stochastic one, and formulate it as a stochastic differential equation (SDE) for the number of infectious individuals $I(t)$.

We then prove that this SDE has a unique global positive solution $I(t)$ and establish conditions for extinction and persistence of $I(t)$. We discuss perturbation by stochastic noise. In the case of persistence we show the existence of a stationary distribution and derive expressions for its mean and variance. The results are illustrated by computer simulations, including two examples based on real life diseases.