Virus Propagation with Randomness

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Abstract

Viruses are organisms that need to infect a host cell in order to reproduce. The new viruses leave the infected cell and look for other susceptible cells to infect. The mathematical models for virus propagation are very similar to population and to epidemic models and involve a relatively large number of parameters. These parameters are very difficult to establish with accuracy, plus there is variability of the cell and virus populations and measurement errors. To deal with this variability, we will consider the parameters to be random variables with a given distribution. We will use a non-intrusive variant of the polynomial chaos method to solve numerically the differential equations of two different virus models. The equations to be solved are the same as for the deterministic case, so they can be solved by standard numerical methods. Some examples are presented.

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