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Understanding Biofilm-Phage Interactions in Mathematical Frameworks

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Abstract

Presence of pathogenic microorganisms in our environment entail enormous problems for humans and livestock. The problem of pathogenic microrganisms is even grievous when they reside in host. Bacteria is one of such pathogenic microorganisms and they prefer to live in communities called Biofilms. Existence of Biofilm in any system is a huge problem because by its nature it is usually difficult to get rid of it by mere antibiotics. There are currently many ongoing studies that focus on how to do away with such pathogens from our systems. Recent medical approach to treating inhost bacteria infection is by introducing bacteriophages (a.k.a phages). Phages are virus which have the potential to prey on bacteria. A better understanding of the different infection strategies of the pathogens, phage-bacteria interactions, pathogen-host infection dynamics enable us to derive optimal treatments to mitigate infectious diseases or develop vaccinations preventing the occurrence of infections altogether. We developed a compartmental model and continuous time markov chains to understand the infection dynamics as well as the state of the infection over time.

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