Abstract

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In this thesis, known compartmental epidemiological models and approaches to their numerical solutions will be analyzed. The first result of this thesis will be a new epidemiological model that includes immunity boosting of a recovered individual encountering an infectious individual. The new model will be generalized for an arbitrary immunity loss curve. The second result of this thesis will be spatially heterogeneous model with population diffusion modeled by a fractional Laplacian. The numerical solutions of new models will be implemented and the results will be visually presented.

Keywords: epidemiological models, SIR model, SIRS model, immunity boosting, heterogeneous SIR model, fractional Laplacian