Solvability and optimal control in spatially structured epidemic models

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Compartmental models are widely used in the mathematical modeling of infectious diseases, where the population is divided into distinct groups or compartments based on disease status. In this talk, we present results - obtained in collaboration with various co-authors - related to compartmental epidemic models that evolve within spatially heterogeneous environments. These models lead to nonlinear systems of reaction-diffusion partial differential equations, subject to homogeneous Neumann boundary conditions and appropriate initial conditions. Particular attention is given to a class of models incorporating a modified chemotaxis-type term, reflecting movement influenced by spatial infection gradients. We will discuss existence and uniqueness of solutions, and outline some optimal control problems.