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Avian Influenza Dynamics in Wild Birds with Bird Mobility and Spatial Heterogeneous Environment

In this talk, I will report some results on a mathematical model that describes the avian influenza dynamics in wild birds with bird mobility and heterogeneous environment incorporated. In addition to establishing the basic properties of solutions to the model, we also prove the threshold dynamics which can be expressed either by the basic reproductive number or by the principal eigenvalue of the linearization at the disease free equilibrium. When the environment factor in the model becomes a constant (homogeneous environment), we are able to find explicit formulas for the basic reproductive number and the principal eigenvalue. I will also present some numerical simulation results to show the impact of the heterogeneous environment on the disease dynamics. Our analytical and numerical results reveal that the avian influenza dynamics in wild birds is highly affected by both bird mobility and environmental heterogeneity.