

Lyapunov Exponents of Random Evolution Equations and Applications in Biology

Wenxian Shen

Abstract

The current talk is concerned with Lyapunov exponents of random evolution equations, including random parabolic and random convolution ones as special cases, and applications to biological models. Particular attention is given to the investigation of principal Lyapunov exponent. It considers to what extent the principal eigenvalue theory of elliptic and periodic parabolic equations can be extended to random parabolic equations as well as random dispersal equations. It also explores the effect of randomness on the principal Lyapunov exponent and proves that the principal Lyapunov exponent of a random evolution equation is always greater than or equal to the one of the associated averaged equation, which has an important biological implication, that is, spatial-temporal variation “favors” population’s persistence. Applications of established principal Lyapunov exponent theory to some biological models are then discussed.