

Uniform persistence for nonautonomous and random parabolic Kolmogorov systems

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Abstract. The purpose of this paper is to investigate uniform persistence for nonautonomous and random parabolic Kolmogorov systems via the skew-product semiflows approach. It is first shown that the uniform persistence of the skew-product semiflow associated with a nonautonomous (random) parabolic Kolmogorov system implies that of the system. Various sufficient conditions in terms of the so called unsaturatedness and/or Lyapunov

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exponents for uniform persistence of the skew-product semiflows are then provided. Among others, it is shown that if the associated skew-product semiflow has a global attractor and its restriction to the boundary of the state space has a Morse decomposition which is unsaturated or whose external Lyapunov exponents are positive, then it is uniformly persistent. More specific conditions are discussed for uniform persistence in n -species, particularly 3-species, random competitive systems.