

Average conditions for permanence in N species nonautonomous competitive reaction-diffusion-advection systems

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One of the important concept in population dynamics is finding conditions under which the population can coexist. Mathematically formulation of this problem we call permanence or uniform persistence. In this talk we consider N species nonautonomous competitive reaction-diffusion-advection system of Kolmogorov type in heterogeneous environment

$$\frac{\partial u_i}{\partial t} = \nabla[\mu_i \nabla u_i - \alpha_i u_i \nabla \tilde{f}_i(x)] + f_i(t, x, u_1, \dots, u_N)u_i, \quad t > 0, x \in \Omega, i = 1, \dots, N. \quad (1)$$

Applying Ahmad and Lazars definitions of lower and upper averages of a function and using the sub- and supersolution methods for PDEs we give a sufficient conditions for permanence in such models. We give also a lower estimation on the numbers δ_i which appear in the definition of permanence in form of parameters of system (1).