

MIMS現象数理カフェセミナー

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Lotka-Volterra competition-diffusion system

Dongyuan Xiao (Meiji University, MIMS)

Abstract : The competitive Lotka–Volterra equation is a simple model of the population dynamics of species competing for some common resource. The general Lotka-Volterra competition-diffusion system is written

$$\begin{aligned}u_t &= u_{xx} + u(1 - u - av), \\v_t &= dv_{xx} + rv(1 - v - bu).\end{aligned}$$

Here $u = u(t, x)$ and $v = v(t, x)$ represent the population densities of two competing species, $d > 0$ and $r > 0$ stand for the diffusion rate and intrinsic growth rate of v (while those of u have been normalized), and $a > 0$ and $b > 0$ represent the strength of v and u , respectively, as competitors. The parameters a and b determine the behavior of the underlying ODE system but, once fixed, the long-time behaviors of the solution are highly dependent on the parameters r , d and the initial datum. The situation is therefore very rich. In this talk, I would like to briefly introduce some well-known results and my research about this system.



問い合わせ: 白石 允梓

Email: m_shiraishi@meiji.ac.jp

