GLOBAL DYNAMICS OF THE LOTKA-VOLTERRA COMPETITION SYSTEM WITH NONLOCAL DIFFUSION

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Abstract

In this talk, we study the global dynamics of the following Lotka-Volterra competition model with nonlocal dispersals:

$$\begin{cases} u_t = d\mathcal{K}[u] + u(m(x) - u - cv) & \text{in } \Omega \times [0, \infty), \\ v_t = D\mathcal{P}[v] + v(M(x) - bu - v) & \text{in } \Omega \times [0, \infty), \\ u(x, 0) = u_0(x) \geq 0, \quad v(x, 0) = v_0(x) \geq 0 \end{cases}$$

where $m(x), M(x) \in C(\bar{\Omega})$, $d, D, b, c > 0$ and two types of nonlocal operators:

(N) $\mathcal{K}[u] = \int_\Omega k(x, y)u(y)dy - \int_\Omega k(y, x)dyu(x)$,
$\mathcal{P}[u] = \int_\Omega p(x, y)u(y)dy - \int_\Omega p(y, x)dyu(x)$,

(D) $\mathcal{K}[u] = \int_\Omega k(x, y)u(y)dy - u(x)$,
$\mathcal{P}[u] = \int_\Omega p(x, y)u(y)dy - u(x)$,

will be considered. Types **(N)** and **(D)** correspond to no flux boundary condition and lethal boundary condition respectively with local dispersal. Our main results consist of two parts. First, when both $k(x, y)$ and $p(x, y)$ are symmetric, the global dynamics can be completely classified provided that $0 < bc \leq 1$. Secondly, when $k(x, y)$ is non-symmetric, while $p(x, y)$ is symmetric, then the global dynamics can be characterized provided that $0 < bc < 1$ and d is sufficiently small or large. This is the joint work with Xueli Bai.