Coexistence steady-states to the Lotka-Volterra competition model with diffusion and advection

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This talk is concerned with the Neumann problem of a stationary Lotka-Volterra competition model with diffusion and advection. First we give sufficient conditions of the existence/nonexistence of nonconstant solutions. Next we derive a shadow system of the model as diffusion and advection of one of the species tend to infinity. The shadow system can be reduced to a semilinear elliptic equation with nonlocal constraint. For the simplified 1D case, the bifurcation structure of nonconstant solutions of the shadow system can be classified according to the coefficients. For example, this structure involves a simple curve of nonconstant solutions which connects two different singularly perturbed states (boundary layer solutions and internal layer solutions).

This talk is based on a joint work with Tohru Tsujikawa (University of Miyazaki).