Analysis Seminar

Unilateral global bifurcation for a class of quasilinear elliptic systems and applications

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Abstract.

An essential issue in Spatial Ecology is to determine conditions that guarantee the persistence of species. When we consider two species living in a habitat and whose spatial movement depends on population density, this study leads us to consider the positive solutions of quasilinear elliptical systems.

Motivated by this, we establish a unilateral bifurcation result for a class of quasilinear elliptic system strongly coupled, extending the bifurcation theorem of [1]. Then, we apply this result to some particular systems arising from population dynamics and we determine a region of existence of coexistence states. In particular, we consider a chemotaxis model and a predator-prey model where the predator traces the density of the prey by spreading in the direction of higher prey concentration.

References

[1] J. López-Gómez, Nonlinear eigenvalues and global bifurcation application to the search of positive solutions for general Lotka-Volterra reaction diffusion systems with two species, Differential Integral Equations 7 (5-6) (1994) 1427–1452.

[2] W. Cintra, C. Morales-Rodrigo and A. Suárez, Unilateral global bifurcation for a class of quasilinear elliptic systems and applications, J. Differential Equations, 267 (2019), 619–657.

[3] W. Cintra, C. A. dos Santos anda J. Zhou, Coexistence states of a Holling type II predator-prey system with self and cross-diffusion terms. Discrete Contin. Dyn. Syst. Ser. B. (in press).