國立交通大學應用數學系
學術演講公告

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講　題：Bifurcation diagrams of a p-Laplacian Dirichlet problem with Allee effect

時　間：102 年 3 月 12 日(星期二) 下午 2:00 –3:00

地　點：(光復校區) 科學一館 223 室

茶　會：當天下午 1:30 (科學一館 205 室)

Abstract

We study bifurcation diagrams of positive solutions for the p-Laplacian Dirichlet problem

$$\begin{cases} \left(\varphi_p\left(u'(x)\right)\right)' + \lambda f(u) = 0, \ -1 < x < 1, \ u(-1) = u(1) = 0, \\ f(u) = u^{p-1} g(u), \end{cases}$$

where $p > 1$, $\varphi_p(y) = |y|^{p-2} y$, $(\varphi_p(u'))'$ is the one-dimensional p-Laplacian, $\lambda > 0$ is a bifurcation parameter, and g is of Allee effect type. Assuming one suitable condition on g, we prove that, on the $(\lambda, \|u\|_\infty)$-plane, the bifurcation diagram consists of exactly one continuous curve with exactly one turning point where the curve turns to the right. Hence the problem has at most two positive solutions for each $\lambda > 0$. More precisely, we are able to prove the exact multiplicity of positive solutions. We give an application to a p-Laplacian diffusive logistic equation with predation of Holling type II functional response. To this logistic equation with multiparameters, more precisely, we give a complete description of the structure of the bifurcation diagrams.

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