DEPARTAMENTO DE ANÁLISIS MATEMÁTICO Y MATEMÁTICA APLICADA

Facultad de Ciencias MATEMÁTICAS

Instituto de Matemática Interdisciplinar

SEMINARIO DE ANÁLISIS MATEMÁTICO Y MATEMÁTICA APLICADA

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Positive solutions for slightly subcritical p-laplacian problems via convexity methods

We consider the following elliptic problem on a bounded regular domain of $\mathbb{R}^N$:

$$\begin{cases} -\Delta_p u = \lambda u^{p-1} + a(x) f(u), & \text{in } \Omega, \\ u > 0 & \text{in } \Omega, \\ u = 0, & \text{on } \partial\Omega, \end{cases}$$

where λ is a real parameter, $a \in C^1(\overline{\Omega})$ changes sign and $f \in C^1(\mathbb{R}^+)$ is a function that is "super-linear", i.e.

$$\lim_{s \to +\infty} \frac{f(s)}{s^{p-1}} = +\infty$$

and "slightly sub-critical", in the sense that

$$\lim_{s \to +\infty} \frac{f(s)}{s^{p^*-1}} = 0, \quad p^* = \text{ Sobolev critical exponent for } W_0^{1,p}(\Omega).$$

A model that we have in mind is $f(s) = \frac{s^{p^*-1}}{\ln(c+s)^{\alpha}}, \quad \alpha > 0.$

We use standard variational and topological methods to prove the existence of up two positive solutions for some values of λ. The main issue is the validity of the Palais-Smale condition and the bifurcation theorem of Drabek for nolinearities f which does not have a "power-like" growth. We propose here a Orlicz-type approach to get the necessary compact embeddings.

This talk is based on a joint work with Rosa Pardo (Universidad Complutense de Madrid).

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Facultad de CC. Matemáticas, UCM