Research

Analysis Seminar

Existence Results for Some Anisotropic Singular Problems via Sub-supersolutions

Leandro da Silva Tavares
Federal University of Cariri

Date: March 20, 2020
Time: 10:30 am

Mathematics Department Auditorium

Abstract. In this talk we present some existence results for the anisotropic singular problems

$$\begin{cases} -\sum_{i=1}^{N} \frac{\partial}{\partial x_i}\Big(\Big|\frac{\partial u}{\partial x_i}\Big|^{p_i-2}\frac{\partial u}{\partial x_i}\Big) = \frac{1}{u^{\gamma}} + \beta f(x,u) \text{ in } \Omega, \\ u > 0 \text{ in } \Omega, \\ u = 0 \text{ on } \partial\Omega, \end{cases}$$

and

$$\begin{cases} -\sum_{i=1}^{N} \frac{\partial}{\partial x_i}\Big(\Big|\frac{\partial u}{\partial x_i}\Big|^{p_i-2}\frac{\partial u}{\partial x_i}\Big) = \frac{1}{v^{\gamma_1}} + \beta_1 f_1(x,v) \text{ in } \Omega, \\ -\sum_{i=1}^{N} \frac{\partial}{\partial x_i}\Big(\Big|\frac{\partial v}{\partial x_i}\Big|^{q_i-2}\frac{\partial v}{\partial x_i}\Big) = \frac{1}{u^{\gamma_2}} + \beta_2 f_2(x,u) \text{ in } \Omega, \\ u, v > 0 \text{ in } \Omega, \\ u = v = 0 \text{ on } \partial\Omega, \end{cases}$$

where $\gamma_i \in (0,1)$, $f_i : \overline{\Omega} \times \mathbb{R} \to \mathbb{R}$ are continuous function satisfying certain conditions and $\beta_i > 0$ are constants for $i = 0, 1, 2$ with $\gamma_0 := \gamma, f_0 := f$ and $\beta_0 := \beta$. Here $2 \leq p_1 \leq ... \leq p_N < +\infty$ and $2 \leq q_1 \leq ... \leq q_N < +\infty$ are real numbers. The approach is based sub-supersolutions, truncation arguments and in the Schaefer's Fixed Point Theorem. We quote that approximation arguments were not used. This work was done in colaboration with Giovany Figueiredo (University of Brasília) and Gelson dos Santos (Federal University of Pará). The results presented in this talk can be found in [1].

References

[1] dos Santos, Gelson C. G.; Figueiredo, Giovany M.; Tavares, Leandro S. Existence results for some anisotropic singular problems via sub-supersolutions. Milan J. Math. 87 (2019), no. 2, 249–272.