Research

Seminários de Análise

Gradient estimates for nonlinear elliptic equations with first order terms

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Date: 30/08/2019
Time: 10:30

Auditorium / MAT

Abstract.

This talk is concerned with the study of existence and Lorentz regularity of distributional solutions to a class of non coercive nonlinear elliptic partial differential equations with Dirichlet boundary conditions. The non coercivity is given by the presence of first order terms. To avoid technicalities we present the linear version of such equations.
Let us consider hence the following model problems

$$\begin{cases} -\mathrm{div}\,(A(x)\nabla u) = -\mathrm{div}\,(u\,E(x)) + f(x) & \text{in } \Omega, \\ u = 0 & \text{on } \partial\Omega, \end{cases} \tag{1}$$

and

$$\begin{cases} -\mathrm{div}(A(x)\nabla w) = E(x)\nabla w + f(x) & \text{in } \Omega, \\ w = 0 & \text{on } \partial\Omega, \end{cases} \tag{2}$$

where Ω is a bounded open set of $\mathbb{R}^N$, with $N > 2$, $A(x)$ is a matrix with measurable coefficients that satisfies for $\alpha, \beta > 0$

$$\alpha|\xi|^2 \le A(x)\xi\cdot\xi, \quad |A(x)| \le \beta, \quad \text{a.e. } x \in \Omega, \quad \forall\, \xi \in I\!R^N, \tag{3}$$

the vector field $E(x)$ belongs to the Marcinkiewicz space of order N and the function $f(x)$ belongs to a suitable Lorentz space to be precised.