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Mês de: Julho 2011

SEMINÁRIO DE ANÁLISE E EQUAÇÕES DIFERENCIAIS

Dia 28 de Julho (quinta-feira), às 13h30, na Sala B3-01

"Anisotropic parabolic equations with nonstandard growth conditions: existence, nonpropagation of disturbances from the data and blow-up"

Sergey Shmarev

(University of Oviedo, Spain)

Abstract:

The talk addresses the questions of existence and propagation of disturbances from the data in solutions of anisotropic parabolic equations with nonstandard growth conditions. The prototype of such equations is furnished by the equation $u_t = \sum_{i=1}^{n} D_i \left(|D_i u|^{p_i(x,t)-2} D_i u\right) + c_0|u|^{\sigma(x,t)-2}u + f$. The anisotropy and the variable nonlinearity of the diffusion part lead to certain properties intrinsic for the solutions of equations of this type. We prove that unlike the case of isotropic diffusion the solutions vanish in a finite time even in the absence of absorption (i.e. if $c_0 = 0$), provided that the diffusion is fast in only one direction. It is shown that in the case of slow anisotropic diffusion the supports of solutions display a behavior typical for the solutions of equations with strong absorption terms: the support does not expand in the direction corresponding the slowest diffusion. For certain ranges of the nonlinearity exponents the supports are localized both in space and time. We also discuss the influence of anisotropy on the blow-up of solutions and show that for equations with variable nonlinearity the effects of finite vanishing and blow-up may happen even if the equation becomes linear as $t \to \infty$. The results were obtained in collaboration with Prof. S. Antontsev.

Parcialmente suportado pela FCT ao abrigo do Financiamento Base

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