CONGRESO DE JÓVENES INVESTIGADORES
Real Sociedad Matemática Española
Universidad de Murcia, del 7 al 11 de Septiembre de 2015

New results on the large time behavior for some nonlinear diffusion equations with absorption

Razvan Gabriel Iagar[1], **Said Benachour**[2], **Philippe Laurençot**[3]

In this talk, we report on recent advances in the understanding of the large time behavior for the porous medium equation with absorption:

$$\partial_t u - \Delta u^m + u^q = 0, \quad u = u(t,x),\ (t,x) \in (0,\infty) \times R^N,$$

where $(N-2)_+/N < m < \infty$ and $q > 0$, with emphasis on the two important critical cases:

$$q = q_* := m + \frac{2}{N}, \qquad \text{respectively} \qquad q = m,$$

marking interfaces between the regime dominated by the diffusion process and the one driven by the absorption term. We show that when $q = m$, there is a striking and unexpected difference between the behavior in the case of the fast diffusion equation $m < 1$ and the slow diffusion $m > 1$, solving the latter, where a KPP-type behavior takes place. We also give gradient estimates and a sharp lower bound for solutions in the fast diffusion case, that are new and interesting for themselves.

[1]Instituto de Ciencias Matemáticas (ICMAT)
Nicolás Cabrera, 13-15, Campus de Cantoblanco
28049, Madrid, Spain
razvan.iagar@icmat.es

[2]Institut Elie Cartan,
Université de Lorraine,
Vandoeuvre-les-Nancy, France
said.benachour@univ-lorraine.fr

[3]Institut de Mathématiques de Toulouse,
Université Paul Sabatier,
Route de Narbonne, Toulouse, France
philippe.laurencot@math.univ-toulouse.fr