The Smoothing Property for a Class of Doubly Nonlinear Parabolic Equations

José Miguel Urbano

Departamento de Matemática da Universidade de Coimbra

3001-454 Coimbra, Portugal

e-mail: `jmurb@mat.uc.pt`

Abstract: We consider a class of doubly nonlinear parabolic equations, whose prototype is

$$u_t = \Delta_p(|u|^{m-1}u) , \qquad m(p-1) > 1 ,$$

where Δ_p is the p-Laplace operator; the equations are used in modelling phenomena involving a free boundary with a finite speed of propagation. We prove that nonnegative weak solutions satisfy, in the sense of distributions, the smoothing property $u_t \geq -c\, u/t$; this is a well known fact in some particular cases, like the porous medium equation or the parabolic p-Laplace equation. The result is obtained via regularization and a comparison theorem.

This is a joint work with Carsten Ebmeyer from Bonn.