Minisymposium 9 - Nichtlineare Evolutionsgleichungen und Probleme mit freiem Rand

An Upper Bound for the Waiting Time for Doubly Nonlinear Parabolic Equations

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There is a wide class of equations with the property that their solutions exhibit a waiting time phenomenon, i. e. they have a strict positive waiting time in the following sense: Let $\Omega := \mathrm{supp}(u_0) \subset \mathbb{R}^N$. Then

$$t_\Omega^\star := \sup\{t \geq 0 \mid u(x,\tau) = 0 \text{ for all } x \in \mathbb{R}^N \setminus \Omega \text{ and } \tau \in [0,t]\}$$

is called the *waiting time* for u.
We will sketch the proof for a quantitative upper bound for the waiting time for weak solutions of the doubly nonlinear parabolic equation

$$\begin{cases} (|u|^{q-2}u)_t - \mathrm{div}(|\nabla u|^{p-2}\nabla u) &= 0 & \text{in } \mathbb{R}^N \times [0,\infty)\,, \\ u(x,0) &= u_0(x) & \text{for all } x \in \mathbb{R}^N\,, \end{cases}$$

with parameters $p \geq 2,\ 1 < q < p$ depending on the growth of the initial value u_0 near $x_0 \in \partial\Omega$. This upper bound coincides (apart from a constant factor) with the lower bound given by Giacomelli-Grün [Interfaces Free Bound. **8** No. 1 $(2006),\ 111$–129]. The technique is inspired by Chipot-Sideris [Trans. Am. Math. Soc. **288** $(1985),\ 423$–427].