

Extinction of solutions of the fast diffusion equation

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We consider the problem

$$\begin{cases} u_t = \nabla \cdot (u^{m-1} \nabla u), & x \in \mathbb{R}^n, t > 0, \\ u(x, 0) = u_0(x) \geq 0, & x \in \mathbb{R}^n, u_0 \not\equiv 0. \end{cases}$$

It is well known that conservation of mass holds if and only if $m \geq (n-2)/n$, and for $m < (n-2)/n$ extinction of solutions in finite time may occur for some initial data. This means that there exists an extinction time $T(u_0) \in (0, \infty)$ such that $u > 0$ in $\mathbb{R}^n \times (0, T)$, $u(\cdot, T) \equiv 0$.

We shall discuss results on the asymptotic behavior of solutions near the extinction time obtained in collaboration with John R. King, Juan Luis Vázquez, Michael Winkler and Eiji Yanagida.

References

- [1] *M. Fila, J. L. Vázquez, M. Winkler*: A continuum of extinction rates for the fast diffusion equation. *Comm. Pure Appl. Anal.* *10* (2011), 1129–1147.
- [2] *M. Fila, J. L. Vázquez, M. Winkler, E. Yanagida*: Rate of convergence to Barenblatt profiles for the fast diffusion equation. *Arch. Rat. Mech. Anal.* *204* (2012), 599–625.