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The instantaneous support shrinking phenomenon in the cases of slow and fast diffusion with absorption for a doubly nonlinear parabolic equation.

We deal with the Cauchy problem in the space R^N, $N \geq 1$, for parabolic equation with absorption of the form

$$\partial u^\beta / \partial t - \nabla(|\nabla u|^{p-2} \nabla u) + u^\lambda = 0 \qquad (1),$$

$$u^\beta(x, 0) = u_0^\beta(x), \qquad (2)$$

where the equation is doubly nonlinear and doubly degenerate and the initial datum $u_0^\beta(x)$ is in general a locally finite positive Radon measure, β, p, λ are given positive constants, $\lambda < \min\{\beta, p-1\}$ - which means the strong absorption. We are forced also to assume the corresponding Barenblatt exponent to be positive, that is

$$k = N(p - 1 - \beta) + \beta p > 0, \quad p, \beta, \lambda > 0 \qquad (3),$$

since in the opposite case the Cauchy problem (1),(2) is unsolvable in general when the initial data may be Radon measures.

We prove that the instantaneous support shrinking phenomenon takes place for problem (1),(2) when the initial data satisfy some assumptions on their behaviour at infinity. The instantaneous support shrinking phenomenon means that the support of the solution become compact at any small moment of time $t > 0$ regardless of the support of the initial datum which may coincide with whole space R^N.

We establish the necessary and sufficient conditions on the initial datum for the instantaneous support shrinking phenomenon to take place. We obtain also bilateral estimates for the dimensions of the support of the solution at any small moment $t > 0$, which are exact with respect to rate. The estimates of the support are expressed in terms of behaviour of local variation of the initial datum at infinity - see ([1], [2]).

[1] Degtyarev S.P. Conditions for instantaneous support shrinking and sharp estimates for the support of the solution of the Cauchy problem for a doubly non-linear parabolic equation with absorption.// Sbornik: Mathematics. — 2008. —**199**, N 4.

[2] Degtyarev S.P. Instantaneous support shrinking phenomenon in the case of fast diffusion for a doubly nonlinear parabolic equation with absorption // Advances in Differential Equations. — 2008. — **13**, N 11-12,