

Propagation of singularities in quasilinear parabolic equations with degenerate absorption

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There will be discussed propagation of strong singularities of energy solutions of nonlinear diffusion–absorption type equations in the domain $Q = (0, T) \times \Omega$, $T < \infty$, $\Omega \in \mathbb{R}^n$, $n \geq 1$ with degenerating on some manifold $\Gamma \subset [0, T] \times \Omega$, absorption potential $h(t, x) \geq 0$. In the case when $\Gamma_0 := \Gamma \cap \{0\} \times \Omega \neq \emptyset$ there was elaborated method (see [1], [2]) which allowed to establish sharp conditions on asymptotic of $h(t, x)$ near to Γ , guaranteeing propagation or nonpropagation of strong singularities of solution from Γ_0 onto Γ .

A new version of local energy method gave possibility to treat the case of final degeneracy: $\Gamma \subset \{T\} \times \bar{\Omega}$, $\Gamma \cap \partial\Omega \neq \emptyset$. Particularly, for arbitrary large solution $u(u|_{(0,T) \times \partial\Omega} = \infty)$ there are obtained sharp condition of propagation or nonpropagation of singularity along Γ . Moreover, in the case of regional blow-up there are obtained sharp upper estimate of final profile of solution as $t \rightarrow T$ (see, preliminary results in [3], [4]).

References

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