

Positive solutions of a semilinear heat equation with singular nonlinear term

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We study the existence of positive solutions $u(t, x)$ of the homogeneous Dirichlet problem for the equation $u_t - \Delta u = f(t, x, u)$ on a bounded domain $\Omega \subset \mathbb{R}^N$. Here $f(t, x, z) \rightarrow \infty$ as $z \rightarrow 0$. A model problem is $f(z) = z^{-\gamma}$, $\gamma \in (0, 1]$.

We present some existence and uniqueness results. We also discuss the long time behavior of the solutions, showing that under appropriate assumptions that $u(t, x)$ converges to the stationary solution of the corresponding elliptic problem.