

Singular reaction diffusion equations where a parameter influences the reaction term and the boundary condition (II)

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Abstract

We study the singular semipositone problem:

$$\begin{cases} -u'' = \lambda h(t)f(u); & (0, 1) \\ u(0) = 0 \\ u'(1) + \mu(\lambda)u(1) = 0 \end{cases}$$

where $\lambda > 0$ is a parameter, f is a C^2 increasing function on $[0, \infty)$ such that $f(0) < 0$, $\lim_{s \rightarrow \infty} f(s) = \infty$ and $\lim_{s \rightarrow \infty} \frac{f(s)}{s} = 0$. h is a C^1 nonincreasing function on $(0, 1]$ with $h(1) > 0$ and there exist constants $d_0 > 0$, $\alpha \in [0, 1)$ such that $h(t) \leq \frac{d_0}{t^\alpha}$ for all $t \in (0, 1]$, and μ is a continuous non-negative function on $[0, \infty)$ such that $\mu(0) \geq 0$. We will establish a unique positive solution for $\lambda \gg 1$

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