Uniqueness of Nonnegative Radial Solutions for Semipositone Problems on Exterior Domains

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We consider the problem

$$\begin{cases} -\Delta u = \lambda K\left(|x|\right) f\left(u\right), & x \in \Omega \\ u = 0 & \text{if } |x| = r_0 \\ u \to 0 & \text{as } |x| \to \infty \end{cases}$$

where λ is a positive parameter, $\Delta u = \operatorname{div}\left(\nabla u\right)$ is the Laplacian of u, $\Omega = \{x \in \mathbb{R}^n; n > 2, |x| > r_0\}$, $K \in C^1\left([r_0, \infty), (0, \infty)\right)$ is such that $\lim_{r\to\infty} K\left(r\right) = 0$ and $f \in C^1\left([0, \infty), \mathbb{R}\right)$ is a concave function which is sublinear at ∞ and $f\left(0\right) < 0$. We establish the uniqueness of nonnegative radial solutions when λ is large.