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Positive solutions for infinite semipositone problems on exterior domains.

We study positive radial solutions to the problem

$$\begin{cases} -\Delta u = \lambda K(|x|)f(u), & x \in \Omega \\ u = 0, & \text{if } |x| = r_0 \\ u \rightarrow 0 & \text{as } |x| \rightarrow \infty, \end{cases} \quad (1)$$

where λ is a positive parameter, $\Delta u = \operatorname{div}(\nabla u)$ is the Laplacian of u , $\Omega = \{x \in \mathbb{R}^n, n > 2 \mid |x| > r_0\}$ is an exterior domain and $f : (0, \infty) \rightarrow \mathbb{R}$ belongs to a class of sublinear functions at ∞ such that they are continuous and $f(0^+) = \lim_{s \rightarrow 0^+} f(s) < 0$. In particular we also study infinite semipositone problems where $\lim_{s \rightarrow 0^+} f(s) = -\infty$. Here $K : [r_0, \infty) \rightarrow (0, \infty)$ belongs to a class of continuous functions such that $\lim_{r \rightarrow \infty} K(r) = 0$. We establish various existence results for such boundary value problems and also extend our results to classes of systems. We prove our results by the method of sub-super solutions. (Received July 30, 2011)