

Monotonic sequences of minimal solutions of semilinear elliptic problems

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We deal with the following class of semilinear elliptic problems

$$\begin{cases} \Delta u(x) + f(x, u(x)) + h(\|x\|, x \cdot \nabla u(x)) = 0, & \text{for } x \in \Omega_R, \\ \lim_{\|x\| \rightarrow \infty} u(x) = 0, \end{cases} \quad (1)$$

discussed in the exterior domain $\Omega_R = \{x \in \mathbb{R}^n, \|x\| > R\}$, where $n > 2$. We investigate the existence of monotonic sequences of positive solutions of (1) with the asymptotic decay $u(x) = O(\|x\|^{2-n})$ as $\|x\| \rightarrow \infty$. Our results are based on the iteration approach in which we apply the subsolution and supersolution method developed by Noussair and Swanson. We do not assume either growth conditions on f or the equality $f(\cdot, 0) \equiv 0$. Our approach allows us to consider sublinear as well as superlinear problems.