

**EIGENVALUES OF SINGULAR BOUNDARY VALUE
PROBLEMS AND EXISTENCE RESULTS FOR
POSITIVE RADIAL SOLUTIONS OF SEMILINEAR
ELLIPTIC PROBLEMS IN EXTERIOR DOMAINS**

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1. Introduction. In this paper, we consider the nonexistence, existence and multiplicity of positive radial solutions for semilinear elliptic problems of the form

$$\Delta u + \mu g(|x|)f(u(x)) = 0, \quad \text{in } \Omega, \quad (1.1)$$

$$u = 0, \quad \text{on } \partial\Omega, \quad (1.2)$$

where $\Omega = \{x \in \mathbf{R}^n : |x| > r_o\}$, $r_o > 0$, $n \geq 3$ and μ is a positive real parameter.

We introduce some terminology to facilitate the statement of propositions. We say that given problem (P) has *Prop A for solutions* if there exists $\mu_f > 0$ such that (P) has at least two solutions, at least one solution or none according to $0 < \mu < \mu_f$, $\mu = \mu_f$ or $\mu > \mu_f$, (P) has *Prop B for solutions* if there exists $\mu_f > 0$ such that (P) has at least one solution or none according to $0 < \mu < \mu_f$ or $\mu > \mu_f$, and we say that (P) has *Prop C for solutions* if (P) has a solution for all $\mu > 0$.

By virtue of the strong maximum principle and conditions $(H_1) \sim (H'_2)$ below, solutions of problems that we consider throughout this paper are positive on the interior of their domains.

For Ω an annulus, problem (1.1),(1.2) has been studied by Bandle, Coffman and Marcus [1], Garazia [5], Lin [10], Santanilla [14], Nagasaki and Suzuki [11] and Pacard [13].

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