

MULTIPLE POSITIVE SOLUTIONS TO A SEMILINEAR DIRICHLET PROBLEM IN AN EXTERIOR DOMAIN

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We will present a recent work where we establish the existence of multiple positive solutions to the semilinear Dirichlet problem

$$-\Delta u + \lambda u = f(u), \quad u \in H_0^1(\Omega_R),$$

where $\Omega_R := \{x \in \mathbb{R}^N : |x| > R\}$ with $R > 0$, $N = 2$ or $N \geq 4$, $\lambda > 0$, and the nonlinearity f is either asymptotically linear, or superlinear and subcritical at infinity. We show that the number of positive nonradial solutions becomes arbitrarily large as $R \rightarrow \infty$.

When Ω is the complement of a ball, the problem is known to have a positive radial solution; see [1] and [2]. Thus, it is natural to ask whether the solution found in [3] coincides with the radial one or not. We shall see that it does not, if R is sufficiently large. Moreover, we will show that the number of positive nonradial solutions to this problem becomes arbitrarily large, as $R \rightarrow \infty$, when $N \neq 3$.

Joint work with Mónica Clapp (Universidad Nacional Autónoma de México) and Benedetta Pellacci (Università di Napoli Parthenope).

References

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