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Three solutions for a perturbed Dirichlet problem. (English) Zbl 1141.35030

Nonlinear Anal., Theory Methods Appl., Ser. A, Theory Methods 68, No. 12, 3879-3883 (2008).

Summary: We prove the existence of at least three distinct solutions to the following perturbed Dirichlet problem:

$$\begin{aligned} -\Delta u &= f(x, u) + \lambda g(x, u) && \text{in } \Omega, \\ u &= 0 && \text{on } \partial\Omega. \end{aligned}$$

where $\Omega \subset \mathbb{R}^N$ is an open bounded set with smooth boundary $\partial\Omega$ and $k \in \mathbb{R}$. Under very mild conditions on g and some assumptions on the behaviour of the potential of f at 0 and $+\infty$, our result assures the existence of at least three distinct solutions to the above problem for λ small enough. Moreover such solutions belong to a ball of the space $W_0^{1,2}(\Omega)$ centered in the origin and with radius not dependent on λ .

MSC:

35J65 Nonlinear boundary value problems for linear elliptic equations

35D05 Existence of generalized solutions of PDE (MSC2000)

35J20 Variational methods for second-order elliptic equations

Keywords:

weak solutions; critical points; weakly sequentially lower-semicontinuity; perturbed Dirichlet problem

Full Text: [DOI](#)

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