

Multiplicity of solutions for a nearly critical elliptic equation in a bounded domain in \mathbb{R}^3

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Let Ω be a smooth bounded domain in \mathbb{R}^3 . We consider the following Dirichlet boundary value problem

$$\begin{aligned} -\Delta u &= u^{5-\varepsilon} + \lambda u^q, & u > 0 & \text{ in } \Omega, \\ u &= 0 & & \text{ on } \partial\Omega, \end{aligned}$$

where $1 < q < 3$, $\lambda > 0$, and $\varepsilon > 0$. We show that in suitable ranges for the parameters λ and ε , this problem has at least two solutions. Additionally if $2 \leq q < 3$, we prove the existence of at least three solutions.

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