

Existence and nonexistence of nontrivial solutions for a critical biharmonic equations under the Steklov boundary conditions

duan tian¹, he han¹, and lv yan²

¹Guangxi University

²Beijing Normal University

October 22, 2021

Abstract

In this paper, we study the existence and nonexistence of nontrivial solutions to the following critical biharmonic problem with the Steklov boundary conditions $\Delta^2 u = \lambda |u|^{2^{**}-2} u$ in B_1 , $\Delta u = 0$ on ∂B_1 , where B_1 is a unit ball, $2^{**} = 2/(N-4)$ denotes the critical Sobolev exponent for the embedding $H^2(B_1) \hookrightarrow L^{2^{**}}(B_1)$ and $\partial_n u$ is the outer normal derivative of u on ∂B_1 . Under some assumptions on λ and μ , we prove the existence of nontrivial solutions to the above biharmonic problem by the Mountain pass theorem and show the nonexistence of nontrivial solutions to it by the Pohozaev identity.

Hosted file

wileyNJD-AMA.pdf available at <https://authorea.com/users/442414/articles/542693-existence-and-nonexistence-of-nontrivial-solutions-for-a-critical-biharmonic-equations-under-the-steklov-boundary-conditions>