An eigenvalue problem for nonlinear Schrödinger-Poisson system with steep potential well

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Abstract

In this paper, we study an eigenvalue problem for Schrödinger-Poisson system with indefinite nonlinearity and potential well as follows: -Δu+μV(x)u+K(x)Φu = λf(x)u+g(x)|u|$^{p-2}$u in R^3, -ΔΦ=K(x)uˆ2 in R^3, where 4[?]p<6, the parameters μ, λ>0, V[?] C(R^3) is a potential well, and the functions f [?] L$^{3/2}$(R^3) and g [?] L$^{[?]}$(R^3) are allowed to be sign-changing. It is well known that such a system with the potential being positive constant has two positive solutions when lim$_{|x|-[?]}$g(x)=g$_{[?]}$<0, K=0 in the set {x [?] R^3 : g(x)=0} and λ>λ$_1$(f) with near λ$_1$(f), where λ$_1$(f) is the first eigenvalue of -Δ+ id in H^1(R^3) (see e.g. Huang et al., J. Differential Equations 255, 2463 (2013)). The main purpose is to obtain the existence and multiplicity of positive solutions without the above assumptions for g and K. The results are obtained via variational method and steep potential. Furthermore, we also consider the concentration of solutions as μ-[?].

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