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POSITIVE GROUND STATES FOR A SUBCRITICAL AND CRITICAL COUPLED SYSTEM INVOLVING KIRCHHOFF–SCHRÖDINGER EQUATIONS

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Abstract. In this paper we prove the existence of positive ground state solution for a class of linearly coupled systems involving Kirchhoff-Schrödinger equations. We study the subcritical and critical case. Our approach is variational and based on minimization technique over the Nehari manifold. We also obtain a nonexistence result using a Pohozaev identity type.

1. Introduction

In this article we study the following class of nonlocal linearly coupled systems

$$(\mathrm{S}_\mu)\qquad \begin{cases} \big(a_1+\alpha'(\|u\|_{E_1}^2)\big)(-\Delta u+V_1(x)u)=\mu|u|^{p-2}u+\lambda(x)v & \text{for } x\in\mathbb{R}^3,\\ \big(a_2+\beta'(\|v\|_{E_2}^2)\big)(-\Delta v+V_2(x)v)=|v|^{q-2}v+\lambda(x)u & \text{for } x\in\mathbb{R}^3,\end{cases}$$

where $a_1,a_2>0$, $\alpha,\beta\in C^2(\mathbb{R}_+,\mathbb{R}_+)$ and for each $i=1,2$ we consider the following weighted Sobolev space

$$E_i:=\bigg\{w\in H^1(\mathbb{R}^3):\int_{\mathbb{R}^3}V_i(x)w^2\,dx<\infty\bigg\},$$

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