
Normalized solutions for coupled cubic Schrödinger equations

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Abstract

We consider the system of coupled elliptic equations

$$\begin{cases} -\Delta u - \lambda_1 u = \mu_1 u^3 + \beta u v^2 \\ -\Delta v - \lambda_2 v = \mu_2 v^3 + \beta u^2 v \\ u, v > 0 \end{cases} \quad \text{in } \mathbb{R}^3,$$

searching for solutions satisfying the additional condition

$$\int_{\mathbb{R}^3} u^2 = a_1^2 \quad \text{and} \quad \int_{\mathbb{R}^3} v^2 = a_2^2.$$

Assuming that a_1, a_2, μ_1, μ_2 are positive fixed quantities, we prove existence results for different ranges of the coupling parameter $\beta > 0$. The extension to systems with an arbitrary number of components is discussed, as well as the orbital stability of the solutions for the corresponding Schrödinger equations. This is a joint work with Thomas Bartsch and Louis Jeanjean.

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