Existence and nonexistence of ground state solutions for quasilinear elliptic schrödinger coupled systems with asymptotically periodic potentials *

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Abstract

In this work we are concerned with the existence and nonexistence of ground state solutions for the following class of quasilinear Schrödinger coupled systems

$$\begin{cases} -\Delta u + a(x)u - \Delta(u^2)u = g(u) + \theta\lambda(x)uv^2, & x \in \mathbb{R}^N, \\ -\Delta v + b(x)v - \Delta(v^2)v = h(v) + \theta\lambda(x)vu^2, & x \in \mathbb{R}^N, \end{cases}$$

where $N \geq 3$, $\theta \geq 0$, $a, b, \lambda : \mathbb{R}^N \to \mathbb{R}$ are asymptotically periodic functions. The nonlinear terms g, h are superlinear at infinity and at the origin. By using a change of variable, we turn the quasilinear system into a nonlinear system where we can establish a variational approach with a fine analysis on the Nehari method. For the nonexistence result we compare the potentials $a(x), b(x)$ with periodic potentials proving nonexistence of ground state solutions.

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