

On a periodic Schrödinger equation involving periodic and nonperiodic nonlinearities in \mathbb{R}^2

Claudianor O. Alves

Universidade Federal de Campina Grande, Unidade Acadêmica de Matemática
58429-900, Campina Grande, PB, Brazil

Marcus Cavalcante

Universidade Federal Rural de Pernambuco, Unidade Acadêmica de Garanhuns
55296-901, Garanhuns, PE, Brazil

Everaldo Medeiros*

Universidade Federal da Paraíba, Departamento de Matemática
58051-900, João Pessoa, PB, Brazil

Abstract

We study the existence of solutions for the nonlinear Schrödinger equation

$$-\Delta u + V(x)u = f(x, u) \quad \text{in } \mathbb{R}^2,$$

where the potential V is 1-periodic, 0 lies in a spectral gap from the spectrum of the Schrödinger operator $S = -\Delta + V$ and the nonlinearity $f(x, t)$ has exponential growth in the sense of Trudinger-Moser. The main feature here is that $f(x, t)$ is allowed to be both periodic and nonperiodic in the x variable. Our proofs rely on a linking theorem and the Lions concentration compactness principle.

Keywords and phrases: Schrödinger Operator, Periodic Potential, Spectral Theory, Linking Theorem, Trudinger-Moser Inequality.

AMS Subject Classification: 35J60, 35J20, 35J10.

1 Introduction

In this paper we are concerned with the existence of nontrivial solutions for the nonlinear Schrödinger equation

$$-\Delta u + V(x)u = f(x, u) \quad \text{in } \mathbb{R}^2, \tag{P}$$

where the potential V is 1-periodic and the nonlinearity $f(x, t)$ has exponential growth in the sense of Trudinger-Moser. Equation (P) arises in various branches of mathematical physics and has been

*Corresponding author

Download English Version:

<https://daneshyari.com/en/article/8899842>

Download Persian Version:

<https://daneshyari.com/article/8899842>

[Daneshyari.com](https://daneshyari.com)