NONLINEAR PERTURBATIONS
OF A PERIODIC FRACTIONAL LAPLACIAN
WITH SUPERCRITICAL GROWTH

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Abstract. Our main goal is to explore the existence of positive solutions for a class of nonlinear fractional Schrödinger equation involving supercritical growth given by

$$(-\Delta)^{\alpha} u + V(x)u = p(u), \quad x \in \mathbb{R}^{\mathbb{N}}, \ N \geq 1.$$

We analyze two types of problems, with V being periodic and asymptotically periodic; for this we use a variational method, a truncation argument and a concentration compactness principle.

1. Introduction

In this paper we study the following nonlinear fractional Schrödinger equation

$$(1.1) \qquad (-\Delta)^{\alpha} u + V(x)u = p(u), \quad x \in \mathbb{R}^{\mathbb{N}}, \ N \geq 1,$$

where $0 < \alpha < 1$, $2\alpha < N$, $V \colon \mathbb{R}^{N} \to \mathbb{R}$ is a continuous function and $p \colon \mathbb{R} \to \mathbb{R}$ is a function with supercritical growth.