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SEMICLASSICAL SOLUTIONS FOR FRACTIONAL LOGARITHMIC SCHRÖDINGER EQUATIONS WITH POTENTIALS UNBOUNDED BELOW

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Abstract. In this paper, we consider the following fractional logarithmic Schrödinger equation

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

where $\varepsilon > 0$, $N \geq 1$ and $V(x) \in C\big(\mathbb{R}^N, \mathbb{R}\big)$ is a potential which can be unbounded below at infinity. By considering a new penalization, we show that the problem has a nontrivial solution u_ε concentrating at a local minimum of V as $\varepsilon \to 0$.

1. Introduction

We study the following fractional Schrödinger equations with logarithmic nonlinearity,

$$\varepsilon^{2s}(-\Delta)^s u + V(x)u = u\log u^2, \quad x \in \mathbb{R}^N, \tag{1.1}$$

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