

Accepted Manuscript

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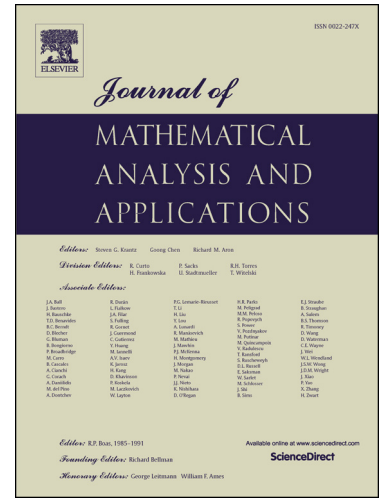
PII: S0022-247X(18)30596-1
DOI: <https://doi.org/10.1016/j.jmaa.2018.07.014>
Reference: YJMAA 22405

To appear in: *Journal of Mathematical Analysis and Applications*

Received date: 23 January 2018

Please cite this article in press as: C. Torres et al., Multiplicity of solutions for a class of non local regional elliptic equations, *J. Math. Anal. Appl.* (2018), <https://doi.org/10.1016/j.jmaa.2018.07.014>

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Multiplicity of solutions for a class of non local regional elliptic equations

César Torres^{*1}, Hernán Cuti^{*2}, Manuel Montalvo^{*3} and Oliverio Pichardo^{**4}

^{*} Departamento de Matemáticas, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n. Trujillo-Perú.

^{**} Escuela Académico Profesional de Matemáticas, Universidad Nacional de Trujillo, Av. Juan Pablo II s/n. Trujillo-Perú.

Abstract

In this article we are interested in the nonlinear Schrödinger equation with non-local regional diffusion

$$\text{Eq00} \quad (0.1) \quad \begin{aligned} (-\Delta)_\rho^\alpha u + u &= f(x, u) \text{ in } \mathbb{R}^n, \\ u &\in H^\alpha(\mathbb{R}^n), \end{aligned}$$

where $\alpha \in (0, 1)$ and $(-\Delta)_\rho^\alpha$ is a variational version of the regional Laplacian, whose range of scope is a ball with radius $\rho(x) > 0$. By using symmetric mountain pass theorem and the genus properties in critical point theory we show that problem (0.1) has infinitely many solutions. Recent results in the literature are complement and significantly improved.

Key words: Regional fractional Laplacian; fractional Sobolev spaces; symmetric mountain pass theorem; genus theory.

MSC: 45G05, 35J60, 35B25.

1. INTRODUCTION

The aim of this article is to study the existence of infinitely many solutions for a class of non-linear Schrödinger equation with non-local regional diffusion

$$\text{Eq01} \quad (1.1) \quad (-\Delta)_\rho^\alpha u + u = f(x, u) \text{ in } \mathbb{R}^n, \quad u \in H^\alpha(\mathbb{R}^n),$$

where $0 < \alpha < 1$, $n \geq 2$. The operator $(-\Delta)_\rho^\alpha$ is a variational version of the non-local regional Laplacian, defined by

$$\text{Eq02} \quad (1.2) \quad \int_{\mathbb{R}^n} (-\Delta)_\rho^\alpha u v dx = \int_{\mathbb{R}^n} \int_{B(0, \rho(x))} \frac{[u(x+z) - u(x)][v(x+z) - v(x)]}{|z|^{n+2\alpha}} dz dx,$$

where $\rho \in C(\mathbb{R}^n, (0, +\infty))$.

¹ctl576@yahoo.es

²hearcuti@gmail.com

³pepo3510@gmail.com

⁴oliver140291@hotmail.com

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