CRITICAL KIRCHHOFF–CHOQUARD SYSTEM INVOLVING THE FRACTIONAL p-LAPLACIAN OPERATOR AND SINGULAR NONLINEARITIES

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ABSTRACT. In this paper we study a class of critical fractional p-Laplacian Kirchhoff–Choquard systems with singular nonlinearities and two parameters λ and μ. By discussing the Nehari manifold structure and fibering maps analysis, we establish the existence of two positive solutions for above systems when λ and μ satisfy suitable conditions.

1. Introduction

In this paper, we investigate the following critical Kirchhoff–Choquard system involving negative exponents and the fractional p-Laplacian operator:

$$
(1.1) \quad
\begin{cases}
\mathcal{L}(u) = \lambda f(x) u^{-\gamma} + \left(\displaystyle\int_\Omega \frac{|v(y)|^{p^*_{\mu,s}}}{|x-y|^\mu}\, dy \right) u^{p^*_{\mu,s}-1} & \text{in } \Omega, \\[2ex]
\mathcal{L}(v) = \mu g(x) v^{-\gamma} + \left(\displaystyle\int_\Omega \frac{|u(y)|^{p^*_{\mu,s}}}{|x-y|^\mu}\, dy \right) v^{p^*_{\mu,s}-1} & \text{in } \Omega, \\[2ex]
u = v = 0 & \text{in } \mathbb{R}^N \setminus \Omega, \\[1ex]
u > 0, \ v > 0 & \text{in } \Omega,
\end{cases}
$$