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Multiple Entire Solutions for Schrödinger-Hardy Systems Involving Two Fractional Operators

The paper is devoted to the study of the following fractional Schrödinger-Hardy system in $\mathbb{R}^n$

$$\begin{cases} (-\Delta)_m^s u + a(x)|u|^{m-2}u - \mu\dfrac{|u|^{m-2}u}{|x|^{ms}} = H_u(x,u,v), \\ (-\Delta)_p^s v + b(x)|v|^{p-2}v - \sigma\dfrac{|v|^{p-2}v}{|x|^{ps}} = H_v(x,u,v), \end{cases}$$

where μ and σ are real parameters, dimension $n > ps$, with $s \in (0,1)$, $1 < m \le p < m_s^* = mn/(n-ms)$, a and b are positive potentials, while H_u and H_v are derivatives of a suitable continuous function H. The main feature of the paper is the combination of two possibly different fractional operators and different Hardy terms with a nonlinearity H which does not necessarily satisfy the Ambrosetti-Rabinowitz condition. By using the symmetric mountain pass theorem, we provide the existence of an unbounded sequence of nonnegative entire solutions. For this, we complete the picture of the existence result stated in Theorem 1.1 by the author, P. Pucci and S. Saldi in [*"Existence of entire solutions for Schrödinger-Hardy systems involving the fractional p-Laplacian"*, Nonlinear Anal. 158 (2017) 109–131].

Keywords: Schroedinger-Hardy systems, existence of entire solutions, fractional p-Laplacian operator.

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