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On a Fractional $p\&q$ Laplacian Problem with Critical Growth

We deal with a class of nonlocal problems of the type

$$\begin{cases} (-\Delta)_p^s u + (-\Delta)_q^s u = \lambda |u|^{r-2}u + |u|^{q_s^*-2}u & \text{in } \Omega \\ u = 0 & \text{in } \mathbb{R}^N \setminus \Omega, \end{cases}$$

where $s \in (0,1)$, $1 < p < q < N/s$, $(-\Delta)_\alpha^s$, with $\alpha \in \{p, q\}$, is the fractional α-Laplacian, Ω is a bounded domain of $\mathbb{R}^N$ and $\lambda > 0$ is a parameter. Roughly speaking, when r is "large" we prove the existence of a solution for large values of λ and when r is "small" we prove the existence of infinitely many solutions for small values of λ.

Keywords: Fractional Laplacians, variational methods, critical exponent.

MSC: 47G20, 35R11, 35A15.