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Kirchhoff-Boussinesq type problems with positive and zero mass

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In this presentation we will treat the question existence of solution for the following class of elliptic Kirchhoff-Boussinesq type problems given by

$$\Delta^2 u - \Delta_p u + u = h(u) \quad \text{in } \mathbb{R}^N \quad \text{and} \quad \Delta^2 u - \Delta_p u = f(u) \ \text{ in } \mathbb{R}^N,$$

where $2 < p \leq \frac{2N}{N-2}$ for $N \geq 3$ and $2_{**} = \infty$ for $N = 3$, $N = 4$, $2_{**} = \frac{2N}{N-4}$ for $N \geq 5$ and h and f are continuous functions that satisfy hypotheses considered by Berestycki and Lions in [2]. More precisely, the problem with the nonlinearity h is related to Positive mass case and the problem with the nonlinearity f is related to Zero mass case. The main argument is to find a Palais–Smale sequence satisfying a property related to Pohozaev identity, as in [4], which was used for the first time by [6], for more details you can see [3].

References

[1] Ambrosio, V. Zero mass case for a fractional Berestycki–Lions–type problem *Advances in Nonlinear Analysis*, 7 (3), 365–374 (2018).

[2] Berestycki, H. and Lions, P.L. Nonlinear Scalar Field equations, I existence of a ground state *Arch. Rational Mech. Anal.*, 82, 313–345 (1983).

[3] Carlos, R. D., Figueiredo, G. M. and Ruviaro, R. Kirchhoff–Boussinesq–type problems with positive and zero mass *Applicable Analysis*, (2023).

[4] Hirata, J., Ikoma, N. and Tanaka, K. Nonlinear scalar field equations in R-N: mountain pass and symmetric mountain pass approaches *Topol. Methods Nonlinear Anal.*, 35 (2) 253–276 (2010).

[5] Hu, D. and Zhang, Q. Existence ground state solutions for a quasilinear Schrödinger equation with Hardy potential and Berestycki–Lions type conditions *Appl. Math. Lett.*, 123, Paper No. 107615 (2022).

[6] Jeanjean, L. On the existence of bounded Palais–Smale sequences and application to a Landesman–Lazer–type problem set on $\mathbb{R}^N$ *Proc. Roy. Soc. Edinburgh Sect. A*, 129 (4), 787–809 (1999).

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