Research

Analysis Seminar

Existence of solutions for a class of quasilinear equations with vanishing potentials

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Date: April 29, 2021

Time: 10:00 am

Abstract. We show the existence of positive solutions for a class of $p\&q$ problems given by

$$\begin{cases} -div\left(a\left(|\nabla u|^{p}\right)|\nabla u|^{p-2}\nabla u\right)+V(x)b\left(|u|^{p}\right)|u|^{p-2}u=\mu f(u)+u^{q^{*}-1} & \text{in } \mathbb{R}^{N}, \\ u\in D^{1,p}(\mathbb{R}^{N})\cap D^{1,q}(\mathbb{R}^{N}), \end{cases}$$

where $N\geq 2$, $1<p\leq q<N$, $q^{*}:=\dfrac{Nq}{N-q}$ and μ is a positive parameter. The potential V can vanish at infinity and f can be supercritical at the origin. We use the Mountain Pass Theorem and Del Pino & Felmer's arguments [2] in order to overcome the lack of compactness.

References

[1] G. S. A. Costa Existence of solutions for a class of quasilinear equations with vanishing potentials, Applicable Analysis,(2022).

[2] M. Del Pino and P. Felmer, *Local mountain pass for semilinear elliptic problems in unbounded domains*, Calc. Var. Partial Differential Equations **4** (1996), 121 - 137.