



ANALYSIS SEMINAR

Multiplicity of negative-energy solutions for singular-superlinear Schrödinger equations with indefinite-sign potential

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Abstract. We are concerned with the multiplicity of positive solutions for the singular superlinear and subcritical Schrödinger equation

$$-\Delta u + V(x)u = \lambda a(x)u^{-\gamma} + b(x)u^p \text{ in } \mathbb{R}^N,$$

beyond the Nehari extremal value, as defined in Il'yasov [1], when the potential $b \in L^\infty(\mathbb{R}^N)$ may change its sign, $0 < a \in L^{\frac{2}{1+\gamma}}(\mathbb{R}^N)$, V is a positive continuous function, $N \geq 3$ and $\lambda > 0$ is a real parameter. The main difficulties come from the non-differentiability of the energy functional and the fact that the intersection of the boundaries of the connected components of the Nehari set is non empty. We overcome these difficulties by exploring topological structures of that boundary to build non-empty sets whose boundaries have empty intersection and minimizing over them by controlling the energy level.

References

- [1] Y. Il'yasov, *On extreme values of Nehari manifold method via nonlinear Rayleigh's quotient*, Topol. Methods Nonlinear Anal. 49 (2017) 683-714.