An Indefinite Elliptic Problem on $\mathbb{R}^N$ Autonomous at Infinity: the Crossing Effect of the Spectrum and the Nonlinearity

Mayra Soares (ssc_mayra@hotmail.com)

Pontifícia Universidade Católica do Rio de Janeiro - PUC-Rio

Abstract. We present a new approach to solve an indefinite Schrödinger Equation autonomous at infinity, by identifying the relation between the arrangement of the spectrum of the concerned operator and the behaviour of the nonlinearity at zero and at infinity. The main novelty is how to set a skillful linking structure that overcome the lack of compactness, depending on the growth of the nonlinear term and making use of information about the autonomous problem at infinity. Here no monotonicity assumptions is required on the nonlinearity, wich may be sign-changing as well as the potential. Furthermore, depending on the nonlinearity, the limit of the potential at infinity may be non-positive, so that zero may be an interior point in the essential spectrum of the Schrödinger operator.

References

[1] COSTA, D. G. AND TEHRANI, H. - Existence and Multiplicity Results for a Class of Schrödinger Equations with Indefinite Nonlinearities. *Adv. in Differential Equations*, **8**, $1319 - 1340$, 2003.

[2] JEANJEAN, L. AND TANAKA, K. - A Positive Solution for an Asymptotically Linear Elliptic Problem on $\mathbb{R}^N$ Autonomous at Infinity. *ESAIM: Cont. Opt. Calc. Var.* **7**, $597 - 614$, 2002.

[3] JEANJEAN, L. AND TANAKA, K. - A Positive Solution for a Nonlinear Schrödinger Equation on $\mathbb{R}^N$. *Indiana University Mathematics Journal*, *54* no. 2, $443 - 464$, 2005.

[4] SATO, Y. AND SHIBATA, M. - Infinitely Many Solutions for a Nonlinear Schrödinger Equation with General Nonlinearity. *Calc. Var. Partial Differential Equations*, *57* no. 5, Art. 137, 2018.