



北京理工大学

数学与统计学院学术报告

Topological degree for normalized solutions of the Nonlinear Schrodinger Equations

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摘要:

We consider the following nonlinear Schrödinger equation:

$$\begin{cases} -\Delta u + V(x)u = au^3 + \mu u & \text{in } \Omega, \\ u > 0 & \text{in } \Omega, \\ u = 0 & \text{on } \partial\Omega, \end{cases} \quad (1.1) \quad [0.1]$$

under the constraint

$$\int_{\Omega} u^2 = 1, \quad (1.2) \quad [0.2]$$

where Ω is a planar unbounded smooth domain with holes, V is an external potential, μ is the Lagrange multiplier and $a > 0$ is a constant. We derive a degree-counting formula for (1.1)-(1.2) if $a \in [a^*, 2a^*)$, where $a^* > 0$ is the threshold value, and thus prove the existence of an excited state solution for (1.1)-(1.2) if $a \in [a^*, 2a^*)$ under certain assumptions on $V(x)$ for $x \in \partial\Omega$ and for $|x|$ large. We also prove that if $V(x) = |x|^2$ and $\Omega = \mathbb{R}^2$, (1.1)-(1.2) has no solution provided $a \geq a^*$.

个人简介: 严树森, 华中师范大学教授。1990年博士毕业于中国科学院系统科学研究所。主要从事非线性椭圆偏微分方程的研究。在Lazer-Mckenna 猜想, 非紧椭圆问题无穷多个正解的存在性, Chern-Simons 方程, 二维不可压欧拉流的去奇异问题, 椭圆问题的波峰解的局部唯一性、非退化性, K-R 型函数临界点的存在性, 准确个数及非退化性等方面做出了重要的工作。研究成果发表在Adv. Math.、Arch. Rat. Mech. Anal.、Comm. Math. Phys.、Comm. Pure Appl. Math.、J. Eur. Math. Soc.、J. Math. Pures Appl.、Math. Ann.、Proc. Lond. Math. Soc.等期刊上。曾主持过国家基金委海外合作项目及延续项目。