WENLU - Workshop on Nonlinear Partial Differential Equations and Geometric Analysis
UFPB - Universidade Federal da Paraíba
João Pessoa - Brazil, February 20-24, 2018

Ground states and concentration for strongly coupled elliptic systems in dimension two

Jianjun Zhang *

In this talk, we are concerned with singularly perturbed strongly coupled elliptic systems

$$\begin{cases} -\varepsilon^2\Delta\varphi + V(x)\varphi = g(\psi) & \text{in } \mathbb{R}^2, \\ -\varepsilon^2\Delta\psi + V(x)\psi = f(\varphi) & \text{in } \mathbb{R}^2, \end{cases} \tag{0.1}$$

where f, g have critical growth in the sense of Trudinger-Moser. Firstly, by using a suitable variational framework based on the generalized Nehari Manifold method, we investigate the existence of ground state solutions of the limit problem

$$\begin{cases} -\Delta u + V_0 u = g(v), \\ -\Delta v + V_0 v = f(u), \end{cases} \tag{0.2}$$

where $V_0 > 0$. We prove that actually the ground state of (0.2) does not change sign, i.e., $uv > 0$ in $\mathbb{R}^2$. Secondly, we apply this result to prove that for $\varepsilon > 0$ small, (0.1) admits a *positive* ground state solution $(\varphi_\varepsilon, \psi_\varepsilon)$ concentrating around the global minimum point of $V(x)$ as $\varepsilon \to 0$.

Joint work with Daniele Cassani (University of Insubria) and with Djairo G. De Figueiredo(UNICAMP) and João Marcos do Ó (UFPB).

*Department of Mathematics, Chongqing Jiaotong University, email: zhangjianjun09@tsinghua.org.cn