

國立中央大學數學系

專題演講

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演講題目：On the Structure of Solutions for Elliptic Partial Differential Equations:

(1) The Self-Dual Chern-Simons $CP(1)$ Model

(2) Some Nonlinear Elliptic Systems

演講時間：2020年06月30日(星期二) 11:00 a.m. ~ 12:00 p.m.

演講地點：中央大學鴻經館M107

Abstract：

In this thesis, we separate it into two parts: (I) The Self-Dual Chern-Simons $CP(1)$ Model (II) Some Nonlinear Elliptic Systems. We consider the nonlinear equation arising from the Chern-Simons theory of planar matter fields interacting with the Chern-Simons gauge field in a $CP(1)$ invariant fashion. Then we establish the sharp region of flux for non-topological solutions and prove the classification of solutions of all types in the case of one vortex point. Moreover, we also give the complete result of Theorem 1.3 in [16]. On the other hand, we prove that the systems of nonlinear elliptic equations

$$(0.1) \quad \begin{cases} \Delta \Phi_1 - \Phi_1 + \theta_1 \Phi_1^p \Phi_2^q = 0 \\ \Delta \Phi_2 - \Phi_2 + \theta_2 \Phi_1^q \Phi_2^p = 0 \end{cases}$$

where $n > 2$, $\theta_1, \theta_2 > 0$, $p > 1$, and $q > 0$, do not possess any double singular positive solutions on the entire domain $\mathbf{R}^n \setminus \{0\}$ and any bounded domain $\Omega \setminus \{0\}$, where Ω is an open ball with radius R and the center at the origin if $p \geq \frac{n+2}{n-2}$. Also, we prove existence of radial entire solutions of (0.1) if we extend the values of radial solutions of (0.1) to negative, and furthermore we obtain that the behaviors of the radial solutions of (0.1) on each finite time R are bounded by two quadratic polynomials, respectively. Indeed, we give a proof of existence of radial entire solutions for other more general nonlinear elliptic systems. Another, we also obtain some characteristics of the behaviors of radial solutions of (0.1)

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