

# 中央研究院數學研究所

Institute of Mathematics, Academia Sinica

## Lectures on P.D.E.

**Speaker** : Prof. Tetsu Mizumachi 水町 徹 教授 (Kyushu University, Japan)

**Title** : *Stability of line solitons for KP-II*

**Abstract** : The KP-II equation

$$\partial_x(\partial_t u + \partial_x^3 u + 3\partial_x(u^2)) + 3\partial_y^2 u = 0 \text{ for } t > 0 \text{ and } (x, y) \in \mathbb{R}^2 \quad (\text{KP-II})$$

is a 2-dimensional generalization of the KdV equation and describes the motion of shallow water waves with weak surface tension. In these talks, I will explain the transversal stability of line soliton solutions which are uniform in the transversal direction. In an exponentially weighted space, the linearized operator of the KP-II equation around the line soliton has a family of continuous eigenvalues converging to 0 that correspond to modulations of the local amplitude and the local phase shift of the crest of the line soliton. I will derive a system of Burgers type equations that describes the local amplitude and the local phase shift of the crest of the line soliton and show that the amplitude of the perturbed line soliton converges to its original amplitude whereas jumps of the local phase shift propagate in a finite speed toward  $y = \pm\infty$ .

1. **11:00~12:00, Thursday, February 13<sup>th</sup>, 2014**

(a) Introduction to soliton solutions and stability theory of KdV solitons and KP-II line solitons

**Venue: Lecture Hall, Inst. of Math. 中研院數學所 6 樓演講廳**

2. **10:00~12:00, Friday, February 14<sup>th</sup>, 2014**

(a) Linear stability of 1-line solitons of KP-II

(b) Derivation of the modulation equations of the local amplitude and the local phase shift of line solitons

**Venue: Seminar Room 617, Inst. of Math. 中研院數學所 617 研討室**

3. **10:00~12:00, Monday, February 17<sup>th</sup>, 2014**

(a) Behavior of solutions of the modulation equations

(b) Estimates for the remainder part (Pego-Weinstein's method in conjunction with a virial identity)

**Venue: Seminar Room 617, Inst. of Math. 中研院數學所 617 研討室**

**Refreshment** : 30 minutes before each lecture