

# 中央研究院數學研究所

Institute of Mathematics, Academia Sinica

## Taipei Postdoc Seminar

**Speaker** : 齊豪 Dr. Hao Qi (本所 Academia Sinica)

**Title** : **Maximum  $d$ -degenerate subgraph of a planar graph**

**Abstract** :

A graph  $G$  is  $k$ -degenerate if every subgraph of  $G$  has a vertex of degree at most  $k$ . The study of induced  $k$ -degenerate subgraphs of planar graphs is related to many other problems, and has been studied by many authors. We are interested in the maximum induced  $d$ -degenerate subgraph of a planar graph. For a non-negative integer  $d$  and a graph  $G$ , denote by  $\alpha_d(G)$  the maximum number of vertices of an induced  $d$ -degenerate subgraph of  $G$ . For  $0 \leq d \leq 4$ , let

$$\tau_d = \inf\{\alpha_d(G)/|V(G)| : G \text{ is a planar graph}\}.$$

It follows from the four colour theorem that  $\tau_0 = 1/4$ . However, proving  $\tau_0 = 1/4$  without using the four colour theorem remains an open problem. Albertson-Berman and Akiyama independently conjectured that  $\tau_1 = 1/2$ . Borodin and Glebov proved that this conjecture is true for planar graphs of girth at least 5. Otherwise, this conjecture is largely open. The best known upper and lower bound for  $\tau_4$  is  $8/9 \leq \tau_4 \leq 11/21$ , the last result was proved by Lukořka, Mazák and Zhu. In this talk, we give a new result  $5/7 \leq \tau_3 \leq 5/6$ ; and conjecture that  $\tau_2 = 2/3, \tau_3 = 5/6, \tau_4 = 11/12$ . This is a joint work with H. A. Kierstead, Sang-il Oum and Xuding Zhu.

**Time** : 11:00 - 12:30, Wednesday, Oct 24, 2018

**Venue** : Room 638, Astro-Math. Buidling (NTU Campus)

**Organizer** : Sheng-Fu Chiu (Academia Sinica), Chien-Hsun Wang (National Center for Theoretical Sciences)

**Refreshment** : 10:30

[https://www.math.sinica.edu.tw/www/file\\_upload/conference/2016TPS/index.html](https://www.math.sinica.edu.tw/www/file_upload/conference/2016TPS/index.html)

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