Research Seminar Series

for Prof Lee Seng Luan, Prof Jon Berrick and Prof Feng Qi

Wednesday, 24 April 2013

2.00pm – 5.00pm

@ Seminar Room #04-06

This year, three of our colleagues will be leaving the department, with Seng Luan's retirement, Jon joining Yale-NUS and Feng Qi returning to the China Academy of Sciences.

In appreciation of their valuable contributions to the department over the years, the department would like to hold a special research seminar series and appreciation dinner in their honour on Wednesday 24 April. For the seminar series, Seng Luan, Jon and Feng Qi's research work will be covered in talks given by our colleagues or themselves.

Programme

I still love B-splines

By Professor Lee Seng Luan

Abstract:

For a positive integer n,

$$\mathcal{S}_n := \{f \in C^{n-2} : f|_{[\nu,\nu+1)} \in \Pi_{n-1}, \nu \in \mathbb{Z}\}$$

is a space of piecewise polynomials of degree $n-1$. The n-fold convolution of the indicator function of the interval $[0,1)$, which we denote by M_n, belongs to $\mathcal{S}_n$. It is the probability density function of the sum of n copies of i.i.d. random variables with uniform distribution on $[0,1)$, and is called the *uniform B-spline of order* n. The family of functions $\{M_n(\cdot - j) : j \in \mathbb{Z}\}$ forms a basis for $\mathcal{S}_n$ in the sense that every $S \in \mathcal{S}_n$ has a unique representation of the form

$$S(t) = \sum_{j\in\mathbb{Z}} s_j M_n(t-j), \quad t \in \mathbb{Z}.$$

B-splines are old (Schoenberg 1945) but beautiful and lovely, and one of the properties that keep them lovely and useful is the refinement equation

$$M_n(t) = \sum_{j=0}^{n} \frac{1}{2^{n-1}} \binom{n}{j} M_n(2t-j), \quad t \in \mathbb{R}.$$

The talk will cover a brief historical and recent development of B-splines and their applications and mention some of my contributions.

Intertwining algebraically and geometrically

by Professor Jon Berrick

Abstract: This talk relates to two fruitful collaborations within the Department. The first is algebraic; originally it addressed the question "Which matrices A have the property that any sequence of row operations on A is equivalent to a sequence of column operations?" Subsequently, it led to research in algebraic K-theory and algebraic number theory. The second part of the talk refers to geometric intertwining, more commonly known as braiding. Rather than explore the topological technicalities, we'll look at some interesting recent applications of braid theory.

Of mice and men

By Professor Chong Chi Tat

Abstract: We give a brief summary of the major contributions of Feng Qi to set theory and the foundations of mathematics.