2010 SUMMER

Workshop for Young Mathematicians in Korea

일시: 2010. 8. 2.(월) ~ 2010. 8. 4.(수)

장소: KAIST 자연과학동 공동강의실(#1501)

주최: KAIST 수리과학과, POSTECH 수학과

후원: KAIST 수리과학과 인재양성사업단 BK21

◈ Timetable

2010 Summer

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Date Time	August 2 (Monday)		August 3 (Tuesday)	August 4 (Wednesday)
09:30~10:30			이정욱 (연세대)	이계선 (KAIST)
11:00~12:00			김도형 (POSTECH)	이승규 (POSTECH)
12:00~13:30			Lunch	Lunch
	13:00 ~ 13:30	김동수 (KAIST)		
13:30~14:30	김명선 (서울대)		Panel 1	문한봄 (서울대)
15:00~16:00	배준식 (POSTECH)		Panel 2	김민훈 (POSTECH)
16:30~17:30	강철민 (KAIST)		Panel 3	진상원 (KAIST)

◇ 8 월 3, 4 일 아침에는 샌드위치가 제공됩니다.

◇ 등록을 하신 모든 분들께 8 월 3, 4 일 점심과 8 월 3 일 저녁이 제공됩니다.

◇ 8 월 2 일 저녁에는 Banquet 이 있습니다.

◈ Title & Abstract

김명선 (서울대학교)

Title: Contemporary cryptography introduction

Abstract: We briefly introduce the notion of public key cryptography as well as various intractability assumptions. The introduction includes RSA and ElGamal encryption and signature schemes as a toy example. Then we turn into our current research topic: computation on encrypted data. For convenience, without any mathematical notation we explain the concept, the notion and some business scenarios for the problem.

배준식 (POSTECH)

Title: Fourier restriction conjecture and its interplay with geometric measure theory : the Kakeya conjecture

Abstract: When can we estimates the "size" of fourier transform of a function in terms of "the" function? It is a basic question in analysis. As you know, there is an well-known inequality : Housdorff-Young inequality. But, what will happen if we restrict the space to a hypersurface instead of $\mathbb{R}^n$? This is the Fourier restriction conjecture.

In fact, Fourier transform has amazing relationships with the Kakeya set - a compact set in $\mathbb{R}^n$ which contains unit lines in every direction. It seems that there is no relationship between them at all !!

I will talk about the Fourier restriction conjecture mostly, which is one of the most famous problem in harmonic anlaysis, and introduce you some consequence about the relationship between the Fourier restriction conjecture and the Kakeya conjecture(All Kakeya set in n-dimensional Euclidean space have Hausdorff dimension n).

강철민 (KAIST)

Title: Introduction to affine processes and its applications to mathematical finance

Abstract: The aim of this talk is to introduce the affine processes which is important in the modelling of short rates, default intensities, and stochastic volatilities. Importance of the affine processes comes from the analytic tractability, nonnegativity, and the mean-reverting property. In this talk, I will focus mainly on the analytic tractability of affine processes. In general, the characteristic functions of affine processes can be obtained by solving the generalized Ricatti differential equation, and in some special cases the equation admits closed form solution. Using the characteristic function, one can easily compute the price of various options including bond derivatives, quantos, foreign bond options, and chooser options . If time permits, we will discuss recent development of affine processes on positive semi-definite matrices.

이정욱 (연세대학교)

Title: Model theory and o-minimal structures

Abstract: In this talk, we will introduce basic notions for model theory, 1st order language, formulas, and structures. And we will introduce o-minimal structures where any unary definable set is a union of finite intervals and points. At last, we study about the real number field with exponential function.

김도형 (POSTECH)

Title: Iwasawa theory for elliptic curves

Abstract: The Birch and Swinnerton-Dyer(BSD) conjecture is one of the central open problems in number theory. It asserts that the rank of an elliptic curve defined over rationals must be the same as the order of vanishing at s=1 of the L-function associated to the curve. The aim of my talk is to explain the Birch and Swinnerton-Dyer conjecture and its p-adic analogue.

이계선 (KAIST)

Title: An introduction to Coxeter polytopes

Abstract: A Coxeter polytope in the space X of constant curvature is a polytope whose dihedral angles are all submultiples of π. Coxeter polytopes arise as fundamental domains of discrete reflection groups acting on X. I will talk about the basic notions and properties of Coxeter polytopes.

이승규 (POSTECH)

Title: Stochastic calculus, application of real analysis in finance

Abstract: In various fields of pure or social science, including life science and finance, many mathematical tools are used to explain randomness in nature. The direction of movement of molecular particles and stock prices is unpredictable, or not deterministic. In 1905, Einstein firstly formulate the movement of molecules, Brownian movement or motion, which was qualitatively introduced by Brown in 1827, and Wiener made a great contribution in the field of stochastic calculus by finding many mathematical properties of Brownian motion. Since Bachelier found that the price movement in Paris stock market is similar to that of pollen suspended on water surface and Ito founded calculus for Brownian motion, stochastic calculus has been widely used in finance. In this presentation, I'll explain how the mathematical system of stochastic calculus was established by those frontiers in the point of view of real analysis. My presentation won't be so difficult to all graduate and even undergraduate students who took a real analysis course. At the end of my presentation, I'll briefly introduce main results of my recent research which is about American option pricing.

문한봄 (서울대학교)

Title: Intoduction to moduli spaces

Abstract: In algebraic geometry, a moduli space is a space whose points represent certain algebro-geometric objects. Frequently, a moduli space itself has a algebro-geometric space such as variety, scheme or stack. In this talk, we introduce the notion of moduli spaces, and discuss several reasons why many mathematicians study moduli spaces.

김민훈 (POSTECH)

Title: Introduction to Knot theory

Abstract: We will discuss introductory knot theory. We will study about Reidemeister moves, Seifert surface, intersection form, Seifert form, Alexander polynomial and some detailed examples.

진상원 (KAIST)

Title: Introduction to finite element method

Abstract: Finite element method has been developed to solve PDE's in numerical way. There are several types of finite element method to deal with different types of PDE's and also to solve PDE's more efficiently. In this talk, I'm going to introduce basic types of FEM(the finite element method), and how this basic types of FEM modified so we can take a look into the relation between characteristic of PDE and appropiriate FEM scheme.

◈ Panel Sessions

주제: 수학과 졸업생의 인생

Panel 1 일반 회사에 취직한 수학과 졸업생의 인생

연사: 박광규 (KAIST 수리과학과 박사, 웹솔루스 이사)

Panel 2 수학 이외의 학계에 진출한 수학과 졸업생의 인생

연사: 정교민 (MIT 수학과 박사, KAIST 전산학과 교수)

Panel 3 수학 학계에 남은 수학과 졸업생의 인생

연사: 임미경 (서울대 수리과학부 박사, KAIST 수리과학과 교수)

◈ 참가자 명단

이름	소속	과정
권상훈	서울대	석사과정
박진형	KAIST	박사과정
손주락	KAIST	박사과정
김승혁	POSTECH	석박통합과정
장혜진	POSTECH	석박통합과정
김명선	서울대	박사과정
문한봄	서울대	석박통합과정
이정욱	연세대	석박통합과정
강철민	KAIST	석박통합과정
이계선	KAIST	박사과정
진상원	KAIST	박사과정
김도형	POSTECH	석박통합과정
김민훈	POSTECH	석박통합과정
배준식	POSTECH	석박통합과정
이승규	POSTECH	석박통합과정
김영락	KAIST	석박통합과정
문현석	KAIST	석사과정
조용화	KAIST	석사과정
임상섭	KAIST	석사과정
박효원	KAIST	박사과정
황택규	KAIST	석박통합과정
박선정	KAIST	박사과정
최강현	KAIST	박사과정

송종백	KAIST	석사과정
조영진	KAIST	박사과정
김병일	서울대	석사과정
김민중	서울대	석사과정
김준태	서울대	석사과정
김상연	서울대	석사과정
나주한	서울대	석박통합과정
정기룡	서울대	석박통합과정
이창훈	서울대	석사과정
강신욱	KAIST	박사과정
이대관	KAIST	석박통합과정
신동원	POSTECH	석사과정
김현정	POSTECH	석박통합과정
송민경	POSTECH	석박통합과정
경대현	KAIST	석사과정
김미란	서울대	석사과정
황태랑	KAIST	석사과정
주승로	POSTECH	석박통합과정
최영노	KAIST	석사과정
조다혜	서울대	석사과정
이석형	Stanford	학사과정
정의찬	서울대	석사과정
이은정	KAIST	석사과정
김기찬	KAIST	박사과정
하재순	KAIST	박사과정

권명기	서울대	석사과정
김명재	서울대	석사과정
조은애	서울대	석사과정
권오정	KAIST	석사과정
홍미희	KAIST	학사과정
박수용	KAIST	석사과정
나영훈	KAIST	석사과정
권예현	서울대	석사과정
권세정	KAIST	석사과정
노형빈	POSTECH	학사과정
임성수	KAIST	석사과정
노동영	KAIST	석박통합과정
이승우	KAIST	석사과정
백형렬	Cornell	박사과정
이준경	KMA	.
김민규	서울대	석박통합과정
이종문	KAIST	석사과정
이태호	KAIST	석사과정
김지민	KAIST	석사과정