

Graph connectivity in edge-colored graphs

Boram Park

Abstract

In this talk, graph connectivity in edge colored graphs are considered. Focus on two different types of connectivity, that are rainbow connectivity and monochromatic connectivity, the recent results are presented.

Department of Mathematics, Ajou University, Suwon 16499, Korea

E-mail : borampark@ajou.ac.kr

의료분야 문제해결을 위한 수학의 응용

Chi Young Ahn

Abstract

의료수학이란 수학적 해석과 모델링의 수학 이론을 통합적으로 이용하여 의료현장에서 발생하는 문제들을 해결하는 분야이다. 질병 또는 질환을 가지고 있는 환자가 병원에 내원하여 진찰, 검사, 진단, 치료 등의 과정을 거칠 때 의료현장에서는 다양한 수학이 사용되고 있으며, 환자들에게 더 나은 의료서비스를 제공하기 위해서도 수학을 통한 혁신기술이 의료현장에서 요구된다. 병원 의료현장에서 발생하는 의료수학문제 이외에도 발병에 영향을 미치는 감염병의 확산 예측 연구와 치료에 필요한 신약개발 연구는 포괄적인 의료수학연구에 포함된다. 이번 발표에서는 의료수학의 이해와 함께 국가수리과학연구소에서 수행하고 있는 의료수학 연구사례를 소개하고자 한다.

ICIM, National Institute for Mathematical Science, Daejeon 34047, Korea

E-mail : chiyoung@nims.re.kr

Infinite families of cyclotomic function fields over the rational function field

Jinjoo Yoo

Abstract

We explicitly construct infinite families of the maximal real subfields of cyclotomic function fields over the rational function field $k = \overrightarrow{F}_q(T)$ whose ideal class groups have arbitrary ℓ^n -rank for $n = 1, 2$, and 3 where ℓ is a prime divisor of $q - 1$. We also obtain a tower of cyclotomic function fields K_i whose maximal real subfields have ideal class groups of ℓ^n -ranks getting increased as the number of the finite places of k which are ramified in K_i get increased for $i \geq 1$. This is a joint work with Yoonjin Lee (Ewha Womans University).

Department of Mathematical Sciences, UNIST, Ulsan 44919, Korea

E-mail : jinjooyoo@unist.ac.kr

Riordan Posets

Arnauld Mwafise

Abstract

In this talk, we introduce a new class of partially ordered sets (posets) which we refer to as *Riordan posets*. In essence, Riordan posets constitute a special class of posets defined by Riordan matrices. We show the connection between Riordan posets and the series-parallel posets which are well known for their applications in electrical engineering and computer science. Additionally, we connect Riordan posets to the notion of operads which is currently an active research area in algebraic combinatorics. Several key observations and examples of Riordan posets will be highlighted during the talk.

Applied Algebra and Optimization Research Center, Sungkyunkwan University, Suwon 16419, Korea

E-mail : arnauld@skku.edu

Semi-Involutory Matrices

Bryan A. Curtis

Abstract

We investigate a new class of matrices. A nonsingular matrix B is semi-involutory provided $B^{-1} = DBE$ for some nonsingular diagonal matrices D and E . These matrices are closely related to G -matrices. Semi-involutory matrices are of interest in part due to their computationally simple inverse. From a combinatorial perspective, semi-involutory matrices also have very interesting structure.

Applied Algebra and Optimization Research Center, Sungkyunkwan University, Suwon 16419, Korea

E-mail : bcurtis@skku.edu

A Limited-Memory Trust-Region Method for Nonlinear Optimization with Many Equality Constraints

Jae Hwa Lee

Abstract

In this talk, we propose a limited-memory trust-region method for solving large-scale nonlinear optimization with many equality constraints. Within the framework of the Byrd-Omojokun algorithm, we adopt the technique proposed by Burdakov et al. [*Math. Prog. Comp.*, 9 (2017), pp. 101–134] to solve the accompanying trust-region subproblems. To successfully deal with the difficulties arising in the case of many constraints, we reduce the number of constraints in the normal subproblem so that the computational cost at each iteration is suitable for large-scale problems, and we establish the global convergence of the proposed method in that case. Numerical experiments on some CUTEst test problems (Gould et al., 2015) are reported. (This is joint work with Prof. Yoon Mo Jung and Prof. Sangwoon Yun.)

Department of Mathematics, Sungkyunkwan University, Suwon 16419, Korea

E-mail : jhlee2chn@skku.edu

Gamma spectrum of non-degenerate functions with simplicial Newton polytopes

Youngho Yoon

Abstract

We define the gamma-spectrum of Newton non-degenerate functions with simplicial convenient Newton polytopes as a first approximation of the spectrum, generalizing Arnold's picture in the 2 variable case. Analyzing their difference, we can find simple formulas for the spectrum and spectral pairs in the 3 or 4 variable case. This is a joint work with Seung-Jo Jung, In-Kyun Kim, and Morihiko Saito.

Applied Algebra and Optimization Research Center, Sungkyunkwan University, Suwon 16419, Korea

E-mail : mathyyoon@skku.edu

MacWilliams identity with various metrics

Boran Kim

Abstract

Linear codes constitute an important family of error-correction codes and have a rich algebraic structure. These codes are studied with respect to various metrics. Here, we introduce the split ρ weight enumerator and Lee complete ρ weight enumerator of linear codes over R , where R is a finite Frobenius commutative ring with unity and ρ metric. We can derive the MacWilliams identities for each of these ρ weight enumerators.

Applied Algebra and Optimization Research Center, Sungkyunkwan University, Suwon 16419, Korea

E-mail : borank@skku.edu

Periodic points of the multi-valued function related to Rogers-Ramanujan continued fraction

Myunghyun Jung

Abstract

Rogers-Ramanujan continued fraction $r(\tau)$ is

$$r(\tau) = \frac{q^{1/5}}{1 + \frac{q}{1 + \frac{q^2}{1 + \frac{q^3}{1 + \dots}}}} = q^{1/5} \prod_{n \geq 1} (1 - q^n)^{(n/5)}, \quad q = e^{2\pi i \tau}, \quad \tau \in \mathbb{H}.$$

Here, $(n/5)$ is the Legendre symbol and $\mathbb{H}$ denotes the upper half-plane. Let $g(x, y) = (y^4 + 2y^3 + 4y^2 + 3y + 1)x^5 - y(y^4 - 3y^3 + 4y^2 - 2y + 1)$. Then, $g(r(\tau), r(5\tau)) = 0$. So, $r(\tau)$ is a periodic point of the multi-valued algebraic function $w = g(z)$ defined by $g(z, g(z)) = 0$. In this talk, we present Morton's results about the Rogers-Ramanujan continued fraction $r(\tau)$ as a periodic point of the multi-valued function $w = g(z)$.

Applied Algebra and Optimization Research Center, Sungkyunkwan University, Suwon 16419, Korea

E-mail : mhjung07@skku.edu