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2018년도 강원경기수학회

학술발표회 및 정기총회

일시 2018년6월 15일~16일

장소 대진대학교

주최 강원경기수학회

주관 대진대학교 수학과
응용대수 및 최적화 연구센터

후원 대한수학회



강원경기수학회

대진대학교 DAEJIN UNIVERSITY

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AORC 응용대수 및 최적화 연구센터

2018년 강원경기수학회
학술발표회 및 정기총회

- **일시 : 2018년 6월 15일–16일**
- **장소 : 대진대학교 이공대 나동**
- **주최 : 강원경기수학회**
- **주관 : 대진대학교**
  응용대수 및 최적화 연구센터
- **후원 : 대한수학회**

프로그램위원회 : 박영호 회장
김병학 편집부회장

조 직 위 원 회 : 이정례 학술부회장
이재진 사업부회장
박상돈 총무이사

강원경기수학회

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학회 장소 (대진대 이공대 나동)

캠퍼스맵

대진대학교 캠퍼스 건물 위치 입니다.



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5.여기숙사4	6.본관	7.교수회관	8.대학원
9.국제학관	10.학생회관	11.대진교육관	12.파워플랜트
13.상생관	14.사회과학관	15.인문학관	16.정보전산원
17.도서관	18.산학협동실습관	19.이공대다동	20.이공대나동
21.이공대가동	22.OLED	23.박물관	24.남기숙사7
25.남기숙사6	26.남기숙사5	27.남기숙사4	28.남기숙사3
29.남기숙사2	30.남기숙사1	31.남기숙사식당	32.예술관
33.학군단	34.생활과학관	35.음악학관	36.미술학관

자세한 교통편은 대진대 홈페이지(http://www.daejin.ac.kr/contents/www/cor/campus3.html)를 참조 하시거나 주최측에 문의하십시오.

발표장 및 행사장

(대진대학교 이공대학 나동)

- 접수 및 등록 414호
- 개회식, 대중강연 및 정기총회 412호
- 분과 I (대수학·이산수학·해석학) 410호
- 분과 II (해석학) 411호
- 분과 III (기하학·수학교육·응용수학) 415호
- 분과 IV (응용수학) 412호
- 강원경기수학회 정기총회 412호
- 휴게실 414호
- 만찬 ..... 포천 한우명가
- 간담회 408호

2018년 강원경기수학회

학술발표회 및 정기총회 일정

1. 일시 : 2018년 6월 15일–16일

2. 장소 : 대진대학교 이공대 나동 412호 외

3. 세부일정

- 2018년 6월 15일 -

- 12:30 – 16:10 ..... 접수 및 등록
- 13:20 – 13:25 ..... 개회 및 환영사
- 13:25 – 13:35 ..... 내외빈 소개
- 13:35 – 14:15 ..... 대중 강연 (서울대 천정희 교수)
- 14:15 – 14:20 ..... 휴식
- 14:20 – 14:45 ..... 2017 학술상 수상 기념 강연 (성균관대 천기상 교수)
- 14:45 – 15:00 ..... 기념사진 촬영
- 15:00 – 15:20 ..... 분과발표 N-1
- 15:20 – 15:40 ..... 분과발표 N-2
- 15:40 – 16:00 ..... 분과발표 N-3
- 16:00 – 16:10 ..... 휴식
- 16:10 – 16:30 ..... 분과발표 N-4
- 16:30 – 16:50 ..... 분과발표 N-5
- 16:50 – 17:10 ..... 분과발표 N-6
- 17:10 – 17:30 ..... 분과발표 N-7
- 17:30 – 17:35 ..... 휴식
- 17:35 – 18:00 ..... 정기총회
- 18:00 – 20:00 ..... 만찬

- 2018년 6월 16일 -

- 10:00 – 12:00 ..... 간담회 (대한수학회장단, 지부회장단)

  - 대한수학회 및 지부학회 상생 발전 방안 -

2018 강원경기수학회 학술발표회 일정표

구분	시간	6월 15일 (금요일)				
등록	12:30-16:10	접수 및 등록				414호
개회	13:20-13:25	개회 및 환영사				412호
	13:25-13:35	내외빈 소개				
대중강연	13:35-14:15	천정희(서울대)				
휴식	14:15-14:20	Coffee Break				
기념강연	14:20-14:45	천기상(성균관대), 2017 학술상 수상 기념 강연				
휴식	14:45-15:00	기념사진 촬영				
논문발표	Parallel Sessions	Session Ⅰ 대수학·이산수학 (410호)	Session Ⅱ 해석학 (411호)	Session Ⅲ 기하학·수학교육·응용수학 (415호)	Session Ⅳ 응용수학 (412호)	
1부	좌 장	이재진(한림대)	김봉진(대진대)	박종안(강원대)	유일(연세대)	
	15:00-15:20	김광호(강원대)	박춘길(한양대)	정재민(경희대) 김경수(경희대)	이윤희(충남대) 최흥수(충남대)	
	15:20-15:40	최환혁(강원대)	심은화(대진대) Paokanta(한양대)	김경수, 곽대훈, 황다솔, 이연호 (경희대)	이민구(군산대) 김정훈(연세대)	
	15:40-16:00	장규환(인천대)	옥지훈(경희대)	김빛나(강원대) 박영호(강원대)	강준혁(Andrews Univ.)	
휴식	16:00-16:10	Coffee Break				
2부	좌 장	장규환(인천대)	김원배(대진대)	김경수(경희대)	박상돈(한경대)	
	16:10-16:30	문병수(인천대)	김광휘(강남대)	최규흥(인하대) 정택선(군산대)	조동현(경기대) 김봉진(대진대) 유일(연세대)	
	16:30-16:50	서승현(강원대)	신동윤(서울시립대)	오윤명(Andrews Univ.)	정다래(강원대) Yang, 김준석(고려대)	
	16:50-17:10	서영주(대진대)	이정례(대진대)	이현진(경북대) 서영진(경북대)	표재홍(강원대)	
	17:10-17:30	김희식(한양대)	윤성식(한신대)	우창화(우석대) Garay(Vascue Univ.)	노재옥(한림대)	
휴식	17:30-17:35	Coffee Break				412호
총회	17:35-18:00	정기총회				412호
만찬	18:00-20:00	만찬장소: 포천 한우명가 (031-544-9280)				

분과별 발표 일정

I. Algebra and Discrete Mathematics

(발표장소 410호)

I-1 (15:00 – 15:20)

Lifts of the duadic codes over $\mathbb{Z}_{p^e}$

Kwang Ho Kim (Kangwon National University)

I-2 (15:20 – 15:40)

On self-dual codes with fixed-point free involution automorphism

Whan-Hyuk Choi (Kangwon National University)

I-3 (15:40 – 16:00)

Characterizations of PvMDs

Gyu Whan Chang (Incheon National University)

I-4 (16:10 – 16:30)

On the wave-breaking phenomena and global existence for the periodic rotation-two-component Camassa-Holm system

Byungsoo Moon (Incheon National University)

I-5 (16:30 – 16:50)

Continued fractions of Lucas numbers

Seunghyun Seo (Kangwon National University)

I-6 (16:50 – 17:10)

Analytic real algebras

Young Joo Seo (Daejin University)

I-7 (17:10 – 17:30)

Almost psi-fuzzy semi-ideals in groupoids

Hee Sik Kim (Hanyang University)

II. Analysis

(발표장소 411호)

II-1 (15:00 – 15:20)

Additive (s,t)-functional inequalities

Choonkil Park (Hanynag University)

II-2 (15:20 – 15:40)

Additive rho-functional equations in non-Archimedean Banach spaces

Eun Hwa Shim (Daejin University)

Siriluk Paokanta (Hanyang University)

II-3 (15:40 – 16:00)

Introduction to regularity theory for elliptic equations of p-Laplacian type

Jihoon Ok (Kyung Hee University)

II-4 (16:10 – 16:30)

The superstability of a generalized trigonometric functioal equations

Gwang Hui Kim (Kangnam university)

II-5 (16:30 – 16:50)

Set-valued additive functional equations

Dong Yun Shin (University of Seoul)

II-6 (16:50 – 17:10)

C^*-ternary Jordan bimultipliers in C^*-ternary algebras and its applications

Jung Rye Lee (Daejin University)

II-7 (17:10 – 17:30)

An additive double rho-functional inequality in beta-homogeneous F-spaces

Sungsik Yun (Hanshin University)

III. Geometry, Applied Math and Mathematical Education

(발표장소 415호)

III-1 (15:00 – 15:20)

A survey on high school education using history of mathematics

Jae Min Chung (Kyung Hee University)
Kyungsoo Kim (Kyung Hee University)

III-2 (15:20 – 15:40)

Fundamental mathematics in Bayesian deep learning

Daehoon Gwak (Kyung Hee University)
Dasol Hwang (Kyung Hee University)
Hyunho Lee (Kyung Hee University)
Kyungsoo Kim (Kyung Hee University)

III-3 (15:40 – 16:00)

Beginner's guide to neural networks for the MNIST dataset using MATLAB

Bitna Kim (Kangwon National University)
Young Ho Park (Kangwon National University)

III-4 (16:10 – 16:30)

The application of topological method to the analysis of west capital Pyongyangbu map

Q-Heung Choi (Inha University)
Tacksun Jung (Kunsan National University)

III-5 (16:30 – 16:50)

Involute and evolute of rectifying curves in 3D space

Yun Myung Oh (Andrews University)

III-6 (16:50 – 17:10)

Real hypersurfaces with generalized Tanaka-Webster parallel shape operator in the complex quadric

Hyunjin Lee (Kyungpook National University)
Young Jin Suh (Kyungpook National University)

III-7 (17:10 – 17:30)

Immersed Energy bending curve in hypersurface of Lorentzian Space Forms

Woo Changwha (Woosuk University)
Oscar J. Garay (Vascue University)

IV. Applied Mathematics

(발표장소 412호)

IV-1 (15:00 – 15:20)

Numerical approaches for option pricing under mixed fractional Brownian motion

Younhee Lee (Chungnam National University)
Heungsu Choi (Chungnam National University)

IV-2 (15:20 – 15:40)

Corrected Heston's Stochastic Volatility Model for Vulnerable Option

Min-Ku Lee (Kunsan National University)
Jeong-Hoon Kim (Yonsei University)

IV-3 (15:40 – 16:00)

A general elliptic nonlinear system of two functions with application

Joon Hyuk Kang (Andrews University)

IV-4 (16:10 – 16:30)

A modified Banach algebra over paths of bounded variation

Dong Hyun Cho (Kyonggi University)
Bong Jin Kim (Daejin University)
Il Yoo (Yonsei University)

IV-5 (16:30 – 16:50)

An efficient method for the Cahn-Hilliard equation in complex domains

Darae Jeong (Kangwon National University)
Junxiang Yang (Korea University)
Junseok Kim (Korea University)

IV-6 (16:50 – 17:10)

The Gauge-Uzawa method to solve the non-constant variable desity flows

Pyo, Jae-Hong (Kangwon National University)

IV-7 (17:10 – 17:30)

Incompressible flows

Jaiok Rho (Hallym University)

2018년 강원경기수학회
학술발표회 논문 초록

2018년 6월 15일

강원경기수학회

대중 강연

S-1 (13:35 – 14:15 ⟹ 412호)

동형암호와 개인정보를 보호하는 머신러닝

Jung Hee Cheon
Seoul National University

동형암호는 암호화된 상태에서 모든 계산을 지원하는 이상적인 암호로서 암호학계의 성배(holy grail)로 불리며 1978년 이후 오랫동안 미해결 문제로 알려져 있었다. 2009년 Gentry에 의해 처음 만들어진 후 많은 연구를 거쳐 실용화를 앞두고 있으며 2011년 MIT Technical Review에서 10대 Emerging Technology로도 선정이 되는 등 IT 전반에 큰 이슈가 되고 있다.

본 강연에서는 동형암호의 개념과 스킴, 그리고 이에 대한 구현 결과를 소개하도록 한다. 또한 현재 연구되고 있는 동형암호의 다양한 응용을 제시하고 이의 산업적 활용을 논의하도록 한다.

1. 개인정보 유출이 없이 데이터 분석을 할 수 있는 동형머신러닝
2. 개인정보보호 헬쓰케어와 암호화된 DNA 분석
3. 생체정보를 보호하는 생체인증시스템
4. 드론/스마트카의 제어시스템 보안을 위한 동형제어기술

2017 학술상 수상 기념 강연

S-2 (14:20 – 14:45 ⟹ 412호)

A new aspect of Riordan group via Krylov matrices and corresponding Lie algebra

Gi-Sang Cheon
Sungkyunkwan University

In this talk, we give a new angle to interpret Riordan arrays by showing that every Riordan array can be expressed as a Krylov matrix. We then use this idea to obtain some groups containing the Riordan group as a subgroup. Moreover, we give a description of the corresponding Lie algebra as a vector space of infinite lower triangular matrices. As a main tool, we use the inverse limit sequence of Riordan groups of finite matrices.

I. Algebra and Discrete Mathematics

(발표장소 410호)

I-1 (15:00 – 15:20 $\Longrightarrow$ 410호)

Lifts of the duadic codes over $\mathbb{Z}_{p^e}$

Kwang Ho Kim

Kangwon National University, prime229@gmail.com

Quadratic residue codes are duadic codes when the length is prime. We restrict the length n of the duadic codes to prime. If p and the length n are given, we can find the lifts of them over arbitrary $\mathbb{Z}_{p^e}$ containing the lifts of quadratic residue codes.

I-2 (15:20 – 15:40 $\Longrightarrow$ 410호)

On self-dual codes with fixed-point free involution automorphism

Whan-Hyuk Choi

Kangwon National University, whanhyuk@gmail.com

Self-dual codes which have a fixed-point free involution as an automorphism is to be investigated. That class of codes is permutation-equivalent to a code that has the reverse permutation in its automorphism group. We classify this class of self-dual code over Galois rings of moderate length.

I-3 (15:40 – 16:00 $\Longrightarrow$ 410호)

Characterizations of PvMDs

Gyu Whan Chang

Incheon National University, whan@inu.ac.kr

Let D be an integral domain with quotient field K, $F(D)$ be the set of nonzero fractional ideals of D, and $f(D) = \{I \in F(D) \mid I \text{ is finitely generated}\}$. For $I \in F(D)$, let $I^{-1} = \{x \in K \mid xI \subset D\}$; then $I^{-1} \in F(D)$. Hence, $I_v = (I^{-1})^{-1}$ and $I_t = \cup\{Jv \mid J \subset I \text{ and } J \in F(D)\}$ are well-defined nonzero fractional ideals of D. We say that $I \in F(D)$ is t-invertible if $(II^{-1})_t = D$, and a Prüfer v-multiplication domain (PvMD) is an integral domain in which every nonzero finitely generated ideal is t-invertible. In this talk, we give some new characterizations of PvMDs.

I-4 (16:10 – 16:30 $\Longrightarrow$ 410호)

On the wave-breaking phenomena and global existence for the periodic rotation-two-component Camassa-Holm system

Byungsoo Moon

Incheon National University, bsmoon@inu.ac.kr

In this talk, we discuss the periodic rotation-two-component Camassa-Holm system, which can be derived from the f-plane governing equations for the geophysical water waves with a constant underlying current. The nonlocal nonlinearities on blow-up criteria and wave-breaking phenomena are established. Finally, a sufficient condition for global solutions is obtained by using a method of the Lyapunov function.

I-5 (16:30 – 16:50 $\Longrightarrow$ 410호)

Continued fractions of Lucas numbers

Seunghyun Seo

Kangwon National University, shyunseo@kangwon.ac.kr

Given nonnegative integer n, let F_n and L_n denote the nth Fibonacci and Lucas number. In 1989, Vajda gave the identity

$$\frac{F_{m(r+1)}}{F_{mr}} = L_m + \cfrac{(-1)^m}{L_m + \cfrac{(-1)^m}{L_m + \cfrac{(-1)^m}{\ddots + \cfrac{(-1)^m}{L_m}}}}, \tag{1}$$

for positive integer m and r, where L_m appears r times. In this talk, we prove the identity combinatorially, which was asked by Benjamin and Quinn in 2003. This is joint work Heesung Shin(Inha University)

I-6 (16:50 – 17:10 $\Longrightarrow$ 410호)

Analytic real algebras

Young Joo Seo

Daejin University, heekim@hanyang.ac.kr

In this talk, we construct some real algebras by using elementary functions and discuss some relations between several axioms and its related conditions for such functions. We obtain some conditions for real-valued functions to be a d-algebra.

I-7 (17:10 – 17:30 $\Longrightarrow$ 410호)

Almost psi-fuzzy semi-ideals in groupoids

Hee Sik Kim

Hanyang University, heekim@hanyang.ac.kr

In this talk, we introduce the notions of an almost psi-fuzzy subalgebra and an almost psi-fuzzy semi-ideal in groupoids, which are generalizations of a fuzzy subalgebra and a fuzzy ideal, respectively. We generalize several properties related to fuzzy algebraic structures.

II. Analysis

(발표장소 411호)

II-1 (15:00 – 15:20 $\Longrightarrow$ 411호)

Additive (s,t)-functional inequalities

Choonkil Park

Hanynag University, baak@hanyang.ac.kr

In this talk, we introduce and solve the following additive (ρ_1,ρ_2)-functional inequalities

$$\begin{aligned}\|f(x+y)-f(x)-f(y)\| \le \|\rho_1(f(x-y)-f(x)+f(y))\| \\ +\|\rho_2(f(y-x)-f(y)+f(x))\|,\end{aligned}$$

where ρ_1 and ρ_2 are fixed nonzero complex numbers with $|\rho_1|+|\rho_2|<1$, and

$$\begin{aligned}\|f(x-y)-f(x)+f(y)\| \le \|\rho_1(f(x+y)-f(x)-f(y))\| \\ +\|\rho_2(f(y-x)-f(y)+f(x))\|,\end{aligned}$$

where ρ_1 and ρ_2 are fixed nonzero complex numbers with $|\rho_1|+|\rho_2|<1$. Using the fixed point method and the direct method, we prove the Hyers-Ulam stability of the above additive (ρ_1,ρ_2)-functional inequalities in complex Banach spaces.

II-2 (15:20 – 15:40 $\Longrightarrow$ 411호)

Additive rho-functional equations in non-Archimedean Banach spaces

Eun Hwa Shim

Daejin University, stareun01@nate.com

Siriluk Paokanta

Hanyang University

In this paper, we solve the additive ρ-functional equations

$$f(x+y)+f(x-y)-2f(x)=\rho\left(2f\left(\frac{x+y}{2}\right)+f(x-y)-2f(x)\right),$$

where ρ is a fixed non-Archimedean number with $|\rho|<1$, and

$$f\left(\frac{x+y}{2}\right)+f(x-y)-2f(x)=\rho(f(x+y)+f(x-y)-2f(x)),$$

where ρ is a fixed non-Archimedean number with $|\rho|<|2|$. Furthermore, we prove the Hyers-Ulam stability of the above additive ρ-functional equations in non-Archimedean Banach spaces.

II-3 (15:40 – 16:00 $\Longrightarrow$ 411호)

Introduction to regularity theory for elliptic equations of p-Laplacian type

Jihoon Ok

Kyung Hee University, jihoonok@khu.ac.kr

In this talk, we discuss with basic regularity results for elliptice equations of p-Laplacian type and related topics.

II-4 (16:10 – 16:30 $\Longrightarrow$ 411호)

The superstability of a generalized trigonometric functioal equations

Gwang Hui Kim

Kangnam university, ghkim@kangnam.ac.kr

In this Talk, we study the superstability of the Wilson (generalized cosine) equation and the sine functional equation from the following generalized difference type cosine functional equation

$$f(x+y) - g(x-y) = \lambda \cdot h(x)k(y) \quad \lambda : constant,$$

which $f, g, h, k : V \to A$ can be considered the mixed functional equation of the cosine type functions, and the Wilson type functional equations, V is a vector space and A is a unital normed space.

II-5 (16:30 – 16:50 $\Longrightarrow$ 411호)

Set-valued additive functional equations

Dong Yun Shin

University of Seoul, dyshin@uos.ac.kr

In this talk, we introduce set-valued additive functional equations and prove the Hyers-Ulam stability of the set-valued additive functional equations by using the fixed point method.

II-6 (16:50 – 17:10 $\Longrightarrow$ 411호)

C^*-ternary Jordan bimultipliers in C^*-ternary algebras and its applications

Jung Rye Lee
Daejin University, jrlee@daejin.ac.kr

In this talk, we use the fixed point method to investigate the Hyers-Ulam stability of C^*-ternary bimultipliers and C^*-ternary Jordan bimultipliers on C^*-ternary algebras for the following 2-dimensional functional equation

$$f(x+y,z+w)+f(x+y,z-w)+f(x-y,z+w)+f(x-y,z-w)=4f(x,z).$$

II-7 (17:10 – 17:30 $\Longrightarrow$ 411호)

An additive double rho-functional inequality in beta-homogeneous F-spaces

Sungsik Yun
Hanshin University, ssyun@hs.ac.kr

In this talk, we solve the following additive double ρ-function inequalities

$$\begin{aligned}&\|f(x+y+z)+f(x-y)-f(z)-2f(x)\|\\&\quad\le\|\rho_1(f(x+y+z)-f(x)-f(y)-f(z))\|+\|\rho_2(f(x+y+z)-f(x+y)-f(z))\|\end{aligned}$$

where ρ_1,ρ_2 are fixed complex numbers with $|2\rho_1|^{\beta_2}+|\rho_2|^{\beta_2}<1$, and

$$\begin{aligned}&\|f(x+y+z)-f(x)-f(y)-f(z)\|\\&\le\|\rho_1(f(x+y+z)+f(x-y)-f(z)-2f(x))\|+\|\rho_2(f(x+y+z)-f(x+y)-f(z))\|,\end{aligned}$$

where ρ_1,ρ_2 are fixed complex numbers with $|\rho_1|^{\beta_2}+|\rho_2|^{\beta_2}<1$, and prove the Hyers-Ulam stability of the additive double ρ-functional inequalities in β-homogeneous F-spaces

III. Geometry, Applied Math and Mathematical Education

(발표장소 415호)

III-1 (15:00 – 15:20 $\Longrightarrow$ 415호)

A survey on high school education using history of mathematics

Jae Min Chung

Kyung Hee University, sd85004@hanmail.net

Kyungsoo Kim

Kyung Hee University

It has been reported that using history of mathematics is helpful for students to understand mathematics in the classroom. However, it may be difficult to introduce the history of mathematics in high school classess. In this talk, we present the analysis results of a survey on high school education using history of mathematics.

III-2 (15:20 – 15:40 $\Longrightarrow$ 415호)

Fundamental mathematics in Bayesian deep learning

Daehoon Gwak

Kyung Hee University

Dasol Hwang

Kyung Hee University

Hyunho Lee

Kyung Hee University

Kyungsoo Kim

Kyung Hee University, kyungsoo@khu.ac.kr

Since conventional deep learning model is a point estimation model that deterministically predicts values, it is difficult to quantify the reliability of the model. The Bayesian deep learning is recently introduced from a stochastic approach to overcome this drawback. In this talk, we present fundamental mathematics in Bayesian deep learning. (* Daehoon Gwak, Dasol Hwang, and Hyunho Lee contributed equally to this study as first authors.)

III-3 (15:40 – 16:00 $\Longrightarrow$ 415호)

Beginner's guide to neural networks for the MNIST dataset using MATLAB

Bitna Kim
Kangwon National University, kbn0884@naver.com

Young Ho Park
Kangwon National University, yhpark@kangwon.ac.kr

MNIST dataset is a database containing images of handwritten digits, with each image labeled by an integer from 0 to 9. It is used to benchmark the performance of machine learning algorithms. Neural networks for MNIST are regarded as the starting point of the studying machine learning algorithms. However it is not easy to start the actual programming. In this expository article, we will give a step-by-step instruction to build neural networks for MNIST dataset using MATLAB.

III-4 (16:10 – 16:30 $\Longrightarrow$ 415호)

The application of topological method to the analysis of west capital Pyongyangbu map

Q-Heung Choi
Inha University, qheung@inha.ac.kr

Tacksun Jung
Kunsan National University

We analyse the map of the west capital Pyongyangbu of Old Korea(AD 920) by topological method and geometrical method and compare it with the map of North Korea Pyongyang. By the analyse of the map we find the real corresponding place of the old map. The analysing and finding the real place of the old map is a very good example of geometry education. Many Koreans had learned and recognized that Old Korea(AD 920) was a small country located in the south part of Ablok river. But, after reading this paper they change their old recognitions and they take prides in Great Old Korea.

III-5 (16:30 – 16:50 $\Longrightarrow$ 415호)

Involute and evolute of rectifying curves in 3D space

Yun Myung Oh
Andrews University, ohy@andrews.edu

The idea of rectifying curves in $\mathbb{R}^3$ was introduced by B. Y. Chen in 2003 and many characterizations results have been found with applications in kinematics and mechanics. The idea has been generalized to the arbitrary dimension and it is now called the rectifying submanifold. In this project, we are going to investigate the involute and evolute of rectifying curves in $\mathbb{R}^3$ and find some characterizations of the curve.

III-6 (16:50 – 17:10 $\Longrightarrow$ 415호)

Real hypersurfaces with generalized Tanaka-Webster parallel shape operator in the complex quadric

Hyunjin Lee
Kyungpook National University, lhjibis@hanmail.net

Young Jin Suh
Kyungpook National University

In the class of Hermitina symmetric spaces of rank 2, usually we can give examples of Riemannian symmetric spaces $SU_{m+2}/S(U_2U_m)$ and $SU_{m,2}/S(U_2U_m)$, which are said to be complex two-plane Grassmannians and complex hyperbolic two-plane Grassmannians, respectively.

In this talk, we will consider the complex quadric SO_{m+2}/SO_mSO_2 as another kind of Hermitian symmetric space with rank 2 of compact type different from the previous ones, which is a complex hypersurface in complex projective space $\mathbb{C}P^m$. And it can be regard as a kind of real Grassmann manifold of compact type with rank 2. Accordingly, the complex quadric admits both a complex conjugation structure A and a Kaehler structure J, with anti-commutes with each other, $JA = -AJ$. By using these structures of the ambient space we classify real hypersurfaces with generalized Tanaka-Webster parallel shape operator in the complex quadric.

III-7 (17:10 – 17:30 $\Longrightarrow$ 415호)

Immersed Energy bending curve in hypersurface of Lorentzian Space Forms

Woo Changwha
Woosuk University, legalgwch@naver.com

Oscar J. Garay
Vascue University

We study geodesics in hypersurfaces of a Lorentzian space form $M^{n+1}{}_1(c)$, which are critical curves of the $M^{n+1}{}_1(c)$-bending energy functional, for variations constrained to lie on the hypersurface. We characterize critical geodesics showing that they live fully immersed in a totally geodesic $M^3{}_1(c)$ and that they must be of three different types. Finally, we consider the classification of surfaces in the Minkowski 3-space foliated by critical geodesics.

IV. Applied Mathematics
(발표장소 412호)

IV-1 (15:00 – 15:20 ⟹ 412호)

Numerical approaches for option pricing under mixed fractional Brownian motion

Younhee Lee
Chungnam National University, lyounhee@cnu.ac.kr

Heungsu Choi
Chungnam National University

In this talk, a mixed fractional Brownian motion (mfBm) is considered to describe long-range dependence in the financial market. We develop numerical methods for pricing European and American options under the mfBm and analyze the stability of these proposed methods. Numerical simulations are carried out to show our analysis results.

IV-2 (15:20 – 15:40 ⟹ 412호)

Corrected Heston's Stochastic Volatility Model for Vulnerable Option

Min-Ku Lee
Kunsan National University, mgcorea@kunsan.ac.kr

Jeong-Hoon Kim
Yonsei University

Fouque et al. [1] introduced the corrected Heston's stochastic volatility model. This research studied the price of the vulnerable options [2] and analyzed the features of the vulnerable options under the corrected Heston's stochastic volatility model.

[1] Fouque. J.-P., Papanicolaou, G., Sircar, R., Solna. K. (2011) Multiscale Stochastic Volatility for Equity, Interest Rate, and Credit Derivatives, Cambridge University Press.

[2] Klein, P., Inglis, M. (2011) Pricing Vulnerable European Options When the Option's Payoff can Increase the risk of Financial Distress, Journal of Banking and Finance, 25, 993-1012.

IV-3 (15:40 – 16:00 $\Longrightarrow$ 412호)

A general elliptic nonlinear system of two functions with application

Joon Hyuk Kang
Andrews University, kang@andrews.edu

We study mathematical conditions to guarantee the existence of positive solutions to a general non-linear second order system of partial differential equations with homogeneous boundary conditions. This result may apply to illustrate biological conditions under which species of animals residing in the same environment can peacefully coexist forever.

IV-4 (16:10 – 16:30 $\Longrightarrow$ 412호)

A modified Banach algebra over paths of bounded variation

Dong Hyun Cho
Kyonggi University, j94385@kyonggi.ac.kr

Bong Jin Kim
Daejin University

Il Yoo
Yonsei University

Let $C[0,T]$ denote a generalized analogue of Wiener space, that is, the space of continuous, real-valued functions on $[0,T]$. In this talk we introduce two Banach algebras: one of them is defined on $C[0,T]$ and the other is a space of equivalence classes of measures over paths of bounded variation on $[0,T]$. We establish an isometric isomorphism between them, and evaluate analytic Feynman integrals of the functions in the Banach algebras which play important roles in the Feynman integration theories and quantum mechanics.

IV-5 (16:30 – 16:50 $\Longrightarrow$ 412호)

An efficient method for the Cahn-Hilliard equation in complex domains

Darae Jeong
Kangwon National University, tinayoyo@kangwon.ac.kr

Junxiang Yang
Korea University

Junseok Kim
Korea University

In this study, we present a practical and efficient numerical method for the Cahn-Hilliard (CH) equation in the two- and three-dimensional complex domains. We propose a simple mathematical model for the binary mixture in the complex domains. The model is based on the ternary CH system. An arbitrary domain is represented by the third phase, which is fixed during the temporal evolution of the other phases. Using the local conservation of the sum of the phases, we only need to solve a binary CH equation with a source term. For the numerical solution, we use a practically unconditionally gradient stable scheme for the multi-component CH system. Computational experiments are presented to demonstrate the performance and effectiveness of the proposed method. The numerical results confirm that the proposed algorithm can deal with the complex domains efficiently.

IV-6 (16:50 – 17:10 $\Longrightarrow$ 412호)

The Gauge-Uzawa method to solve the non-constant variable desity flows

Pyo, Jae-Hong
Kangwon National University, jhpyo@kangwon.ac.kr

The Gauge-Uzawa method [GUM], which is a projection type algorithm to solve the time depend Navier-Stokes equations, has been constructed and extended to more complicated problems. Because the studies on GUM have been performed with the first order backward Euler scheme, we have been concentrated to impose BDF2 algorithm. But the classical second order GUM displays weak stability behavior. Recently, the second order stabilized Gauge-Uzawa method has been newly constructed. In this talk, we will extend to solve time evolution Navier-Stokes equations with variable density. We will present theoretical results for stabilities and numerical simulations for air bubble rising in water and Rayleigh-Taylor.

IV-7 (17:10 – 17:30 $\Longrightarrow$ 412호)

Incompressible flows

Jaiok Rho

Hallym University, joroh@hallym.ac.kr

In this talk, we will consider the incompressible flows on an unbounded domain. Then we will see very special properties of the solutions of the incompressible flows on an unbounded domain. As a result we will look at the Euler equations on an unbounded domain.

만찬 장소

포천 한우명가
경기도 포천시 호국로 959 (031-544-9280)

