2016년도 강원경기수학회

학술발표회 및 정기총회



강릉원주대 교육지원센터

Program and Abstracts

일시: 2016년 6월 3일-4일
장소: 강릉원주대학교
주최: 강원경기수학회
주관: 고등과학원(KIAS)
후원: 대한수학회, 강릉원주대학교

강원경기수학회
Kangwon-Kyungki Mathematical Society
www.kkms.org

강릉캠퍼스 캠퍼스 지도



C9 : 교육지원센터

프로그램 위원회

이상구 회장 (성균관대)
천기상 편집이사 (성균관대)

준비 위원회

오주목 수학과장 (강릉원주대)
박영호 부회장 (강원대)
이정례 부회장 (대진대)
손성익 총무이사 (강릉원주대)

2016년도 강원경기수학회

학술발표회 및 정기총회

PROGRAM

논문초록집

일시: 2016년 6월 3일-4일
장소: 강릉원주대학교
주최: 강원경기수학회
주관: 고등과학원(KIAS)
후원: 대한수학회, 강릉원주대학교

2016 강원경기수학회 학술발표회 일정표

구분	시간	6월 3일 (금요일)			
등록	12:30-13:00	참가자 등록(강릉원주대 교육지원센터)			222호 강당
개회	13:00-13:05	개회사 (강원경기수학회장 이상구)			
	13:05-13:10	격려사 (대한수학회장 이용훈)			
	13:10-13:15	환영사 (강릉원주대학교 교무처장)			
	13:15-13:25	내·외빈 (KMS 지부 회장님, KMS 차기 회장님 후보) 소개 및 인사			
기조강연	13:30-14:10	좌장:박영호(강원대) 최형인(서울대), Mathematics in AlphaGo and Beyond			
휴식	14:10-14:30	단체사진 촬영 및 Coffee Break			
논문발표	Paralel Sessions	Session I 해석학·편미방 (422호)	Session II 대수학·수학교육 (425호)	Session III 미분기하·위상수학 (427호)	Session IV 수치해석학·응용수학 (522호)
1부	좌 장	조영금(중앙대)	천기상(성균관대)	최재동(공사)	손성익(강릉원주대)
	14:30-15:00	최규흥(인하대)	박영호(강원대)	김병학(경희대)	박은희(강원대)
	15:00-15:30	이정례(대진대)	박경은(성균관대)	이건희(충남대)	김대욱(서원대)
	15:30-16:00	정재영(군산대)	이강용(성균관대)	김민규(경인교대)	김광연(강원대)
휴식	16:00-16:20	Coffee Break			
2부	좌 장	이정례(대진대)	김병문(강릉원주대)	김병학(경희대)	표재홍(강원대)
	16:20-16:50	김광휘(강남대)	이상구(성균관대)	김상진·정우철(충남대)	김선철(중앙대)
	16:50-17:20	정택선(군산대)	천기상(성균관대)	최재동(공사)	권희춘(서울대)
휴식	17:20-17:40	Coffee Break			
기조강연	17:40-18:20	좌장:이상구(성균관대) LeRoy B. Beasley (Utah State Univ.), Matrix Rank and Linear Preservers			222호 강당
총회	18:20-18:50	정기총회			
만찬	19:00-21:00	만찬장소: 은파횟집 (033-652-9566)			
6월 4일 (토요일)					
3부	좌 장	김광휘(강남대)	박영호(강원대)	최규흥(인하대)	김홍철(강릉원주대)
	10:30-11:00	조동현(경기대)	김병문(강릉원주대)	손성익(강릉원주대)	김택철(강원대)
	11:00-11:30	조영금(중앙대)	최환혁(강원대)	표재홍(강원대)	장덕규(강원대)

세부일정

2016년 6월 3일(금요일)

- 12:30 – 13:00 ..... 등록
- 11:40 – 12:30 ..... 회장단 회의(교직원식당)
- 13:00 – 13:05 ..... 개회사
- 13:05 – 13:10 ..... 격려사
- 13:10 – 13:15 ..... 환영사
- 13:15 – 13:25 ..... 내·외빈 소개 및 인사
- 13:30 – 14:10 ..... 기조강연 : 최형인(서울대)
- 14:10 – 14:30 ..... 단체사진 촬영 및 Coffee Break
- 14:30 – 16:00 ..... 논문발표(1부)
- 16:00 – 16:20 ..... Coffee Break
- 16:20 – 17:20 ..... 논문발표(2부)
- 17:20 – 17:40 ..... Coffee Break
- 17:40 – 18:20 ..... 기조강연 : LeRoy B. Beasley (Utah State Univ.)
- 18:20 – 18:50 ..... 정기총회
- 19:00 – 21:00 ..... 만찬

2016년 6월 4일(토요일)

- 10:30 – 11:30 ..... 논문발표(3부)

기타사항

(1) 만찬장소 : 은파횟집 (033-652-9566)

(2) 연락처 : 이상구 교수(010-7425-7025)
손성익 교수(010-4546-2622)

발표 및 행사장

- 등록 ..... 강릉원주대 교육지원센터
- 개회식 및 기조강연 ..... 222호 강당
- Session I : 해석학, 편미방 422호
- Session II : 대수학, 수학교육 425호
- Session III : 미분기하, 위상수학 427호
- Session IV : 수치해석학, 응용수학 522호
- 정기총회 ..... 222호 강당
- 만찬 ..... 은파횟집 (033-652-9566)

프로그램(Program)

Opening Ceremony (222호 강당)

사회 : 손성익 (강릉원주대, 강원경기수학회 총무이사)

- 13:00 – 13:05 강원경기수학회장 개회사 ..... 이상구 (성균관대)
- 13:05 – 13:10 대한수학회장 격려사 .....이용훈 (부산대)
- 13:10 – 13:15 환영사 .....환영사 (강릉원주대 교무처장)
- 13:15 – 13:25 내·외빈 소개 및 인사 .....사회자

Plenary Lecture (222호 강당)

Chair : 박영호 (강원대)

[PL-1] 13:30 – 14:10 ..... 최형인 (서울대)
Mathematics in AlphaGo and Beyond

- 14:10 – 14:30 Photo and Coffee Break

Session I : 해석학, 편미분방정식 (422호)
Analysis and Partial Differential Equation

- 14:30 – 16:00 (6월 3일) Chair : 조영금 (중앙대)

[AP-1] 14:30 – 15:00 ..... 최규흥 (인하대)
An Application of Category Theory to an Asymmetric Biharmonic Problem

[AP-2] 15:00 – 15:30 ..... 이정례 (대진대)
Additive-quadratic rho-functional inequalities in non-Archimedean Banach spaces

[AP-3] 15:30 – 16:00 ..... 정재영 (군산대)
Baire category theorem and Ulam problem of functional equationson on a set of Lebesgue measure zero

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- 16:20 – 17:20 (6월 3일) Chair : 이정례 (대진대)

[AP-4] 16:20 – 16:50 ..... 김광휘 (강남대)
A fixed point approach to the stability of the functional equation related to distance measures

[AP-5] 16:50 – 17:20 ..... 정택선 (군산대)
Fourth order elliptic system with some singular nonlinear term

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- 10:30 – 11:30 (6월 4일) Chair : 김광휘 (강남대)

[AP-6] 10:30 – 11:00 ..... 조동현 (경기대)
Conditional Fourier-Feynman transforms with change of scales on a function space

[AP-7] 11:00 – 11:30 ..... 조영금 (중앙대)
Radial positive definite functions and the Boltzmann equation

Session II : 대수학, 수학교육 (425호)
Algebra and Mathematical Education

- 14:30 – 16:00 (6월 3일) Chair : 천기상 (성균관대)

[AM-1] 14:30 – 15:00 ..... 박영호 (강원대)
On the quadratic residue codes over rings

[AM-2] 15:00 – 15:30 ..... 박경은 (성균관대)
A study on 3D printed tactile mathematics textbook for visually impaired students

[AM-3] 15:30 – 16:00 ..... 이강용 (성균관대)
Some results on piecewise prime rings

- 16:20 – 17:20 (6월 3일) Chair : 김병문 (강릉원주대)

[AM-4] 16:20 – 16:50 ..... 이상구 (성균관대)
Mobile interactive e-book of Linear Algebra and Engineering Mathematics

[AM-5] 16:50 – 17:20 ..... 천기상 (성균관대)
A group extension problem of the Riordan group

- 10:30 – 11:30 (6월 4일) Chair : 박영호 (강원대)

[AM-6] 10:30 – 11:00 ..... 김병문 (강릉원주대)
Distance Labelings for Some Products of Paths and Cycles

[AM-7] 11:00 – 11:30 ..... 최환혁 (강원대)
Mass formula of self-dual codes over Galois rings

Session III : 미분기하, 위상수학 (427호)
Differential Geometry and Topology

- 14:30 – 16:00 (6월 3일) Chair : 최재동 (공사)

[DT-1] 14:30 – 15:00 ..... 김병학 (경희대)
On conformal transformations and vector fields

[DT-2] 15:00 – 15:30 ..... 이건희 (충남대)
Hyperbolic structure of measure expansive systems

[DT-3] 15:30 – 16:00 ..... 김민규 (경인교대)
Hard Lefschetz property of Hamiltonian circleaction with self-indexing moment map

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- 16:20 – 17:20 (6월 3일) Chair : 김병학 (경희대)

[DT-4] 16:20 – 16:50 ..... 김상진·정우철 (충남대)
Shadowing and topological stability of finitely generated group actions

[DT-5] 16:50 – 17:20 .....최재동 (공사)
The development scheme of the military drone

- 10:30 – 11:30 (6월 4일) Chair : 최규흥 (인하대)

[DT-6] 10:30 – 11:00 ..... 손성익 (강릉원주대)
Flow Modeling and Simulation of Micro Air Vehicle

[DT-7] 11:00 – 11:30 ..... 표재홍 (강원대)
Error estimates for the second order stabilized Gauge-Uzawa method for The Navier-Stokes equations

Special Session IV : 수치해석학, 응용수학 (522호)
Numerical Analytics and Applied Mathematics

- 14:30 – 16:00 (6월 3일) Chair : 손성익 (강릉원주대)

[NA-1] 14:30 – 15:00 ..... 박은희 (강원대)
A Fast Solver for Heterogeneous Elliptic Problems

[NA-2] 15:00 – 15:30 ..... 김대욱 (서원대)
Energy Decay rates for solutions of the viscoelastic hyperboric equation with an internal delay term and mixed Dirichlet-Neumann boundary conditions

[NA-3] 15:30 – 16:00 ..... 김광연 (강원대)
A Posteriori Error Estimators for Elliptic Interface Problems

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- 16:20 – 17:20 (6월 3일) Chair : 표재홍 (강원대)

[NA-4] 16:20 – 16:50 ..... 김선철 (중앙대)
On unimodality appearing in 2D Navier-Stokes flows at large Reynolds number

[NA-5] 16:50 – 17:20 ..... 권희춘 (서울대)
Artificial Intelligence Drone's Future

- 10:30 – 11:30 (6월 4일) Chair : 김홍철 (강릉원주대)

[NA-6] 10:30 – 11:00 ..... 김택철 (강원대)
The Second-order stabilized Gauge-Uzawa Method for Incompressible Flows with Variable Density

[NA-7] 11:00 – 11:30 ..... 장덕규 (강원대)
A Uzawa method using singular functions for Stokes equations : corner singularity

Plenary Lecture (222호 강당)

Chair : 이상구 (성균관대)

[PL-1] 17:40 – 18:20 ..... LeRoy B. Beasley (Utah State Univ.)
Matrix Rank and Linear Preservers

강원경기수학회 정기총회

- 18:20 – 18:50 ..... 222호 강당

Banquet

- 19:00 – 21:00 ..... 은파횟집 (033-652-9566)

논문초록 (Abstracts)

Plenary lecture

PL-1

Mathematics in AlphaGo and Beyond

Hyeong In Choi
Seoul National University, hichoi@snu.ac.kr

We explain how AlphaGo is designed and how the learning is done by focusing on the mathematical models that underlie the inner-workings of AlphaGo. We will then discuss on how AlphaGo-style artificial intelligence may interact with mathematics research and the various ramifications thereof.

PL-2

Matrix Rank and Linear Preservers

LeRoy B. Beasley
Utah State University, leroy.b.beasley@aggiemail.usu.edu

We present several definitions of rank over fields, rings, and anti-negative semirings and discuss their preservers. The historical development of these preserver problems is sketched and we end with a discussion of completely positive rank and the equivalent rank for Boolean matrices and graphs.

Analysis and Partial Differential Equation

AP-1

An Application of Category Theory to an Asymmetric Biharmonic Problem

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

Tacksun Jung
Kunsan National University

We investigate the existence and multiplicity of solutions of an asymmetric biharmonic problem. We get two results. The first result is that there exist at least two weak solutions for this problem. We prove this by using the linking argument principle.

The second one is that there exist at least three weak solutions for this problem. We prove this by using the category theory.

AP-2

Additive-quadratic rho-functional inequalities in non-Archimedean Banach spaces

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

We will talk about the stabilities of Additive-quadratic rho-functional inequalities in non-Archimedean Banach spaces. We solve the additive-quadratic rho-functional inequalities $|M_1 f(x,y)| < |\rho M_2 f(x,y)|$, where ρ is a fixed non-Archimedean number with $|\rho| < 1$, and $|M_2 f(x,y)| < |\rho M_1 f(x,y)|$, where ρ is a fixed non-Archimedean number with $|\rho| < |2|$. Furthermore, we prove the Hyers-Ulam stability of the above two additive-quadratic rho-functional inequalities in non-Archimedean Banach spaces.

AP-3

Baire category theorem and Ulam problem of functional equationson on a set of Lebesgue measure zero

Jaeyoung Chung

Kunsan National University, jychung@kunsan.ac.kr

Let X be a real normed space, Y a Banach space and $f : X \to Y$. Generalizing the result of Gilányi [Proc. Natl. Acad. Sci. USA Vol. 96, pp. 10588-10590] we consider the stability problem of the monomial functional equation

$$\Delta_y^n f(x) - n! f(y) = 0$$

in restricted domains of the form $\Omega \cap \{(x, y) \in X^2 : \|x\| + \|y\| \geq d\}$, where the difference operator Δ_y is defined by $\Delta_y f(x) = f(x + y) - f(x)$ for all $x, y \in X$ and Δ_y^n are defined by $\Delta\Delta_y^{n+1} f = \Delta_y(\Delta_y^n f)$ for all $n = 1, 2,$ and Ω is a rotation of $H \times H \subset X^2$ and H^c is of the first category. As a consequence, we obtain a measure zero stability of the above equation when $f : \mathbb{R} \to Y$.

We also consider an open problem for the stability of the exponential functional equation $f(x + y) - f(x)f(y) = 0$ and the d'Alembert functional equation $f(x + y) + f(x - y) - 2f(x)f(y) = 0$ when $f : X \to \mathbb{C}$.

AP-4

A fixed point approach to the stability of the functional equation related to distance measures

Gwang Hui Kim

Kangnam university, ghkim@kangnam.ac.kr

The functional equation $f(pr, qs) + f(ps, qr) = f(p, q)\, f(r, s)$ is all symmetrically compositive sum form distance measures with a measurable generating function. In this talk, by using of a fixed point theory, we investigates the stability of the functional equations more Pexider type functional equation than the above functional equation as following : $f(pr, qs) + f(ps, qr) = \delta(pq, rs)g(p, q)h(r, s)$, $f(pr, qs) + g(ps, qr) = \theta(p, q, r, s)g(p, q)h(r, s)$ where G is a commutative semigroup, $\delta : G^2 \to \mathbb{R}_k$ is cocycle, $\theta : G^4 \to \mathbb{R}_k$ a function and f, g, h are functionals on G^2.

AP-5

Fourth order elliptic system with some singular nonlinear term

Tacksun Jung*
Kunsan National University, tsjung@kunsan.ac.kr
Q-Heung Choi
Inha University

We consider a fourth order elliptic system with some singular nonlinear term and multiplicity result. We get two theorems which show the number of the weak solutions of this problem. The first theorem is a result which shows that there exist a weak solution for this problem and the second one is an improved result of the first result, which shows that there exist infinitely many weak solutions for this problem. We get the first result by variational method and critical point theory, and get the second result by homology theory.

AP-6

Conditional Fourier-Feynman transforms with change of scales on a function space

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

Let $C[0,T]$ denote an analogue of Wiener space which is the space of real-valued continuous functions on the closed interval $[0,T]$. Using simple formulas for generalized conditional Wiener integrals on $C[0,T]$ we evaluate generalized analytic conditional Fourier-Feynman transforms and convolution products of the cylinder function having the form

$$F_r(x) = f\left(\int_0^T v_1(s)dx, \cdots, \int_0^T v_r(s)dx\right)$$

for a.e. $x \in C[0,T]$, where $f \in L_p(\mathbb{R}^r)$ with $1 \le p \le \infty$ and $\{v_1, \cdots, v_r\}$ is an orthonormal subset of $L_2[0,T]$. We then investigate relationships between the transforms and convolutions, and establish various change of scale formulas for the generalized analytic conditional Fourier-Feynman transforms of F_r. In the evaluation formulas and scale formulas we use multivariate normal distributions so that the orthonormalization process of projection vectors can be removed in the existing change of scale formulas.

AP-7

Radial positive definite functions and the Boltzmann equation

Yong-Kum Cho
Chung-Ang University, ykcho@cau.ac.kr

In many areas of Mathematics, the theory of radial positive definite functions constitutes the core subject to study. By extending the classical Schoenberg's theorem, we study radial positive definite functions by means of the Bessel-Hankel-Schoenberg transforms

$$\int_0^\infty \Omega_\lambda(rt)d\nu(t) \quad \Omega_\lambda(t) = \Gamma(\lambda+1)\left(\frac{t}{2}\right)^{-\lambda} J_\lambda(t)$$

on the class of probability measures supported on $[0,\infty)$, where J_λ denotes the Bessel function of order $\lambda \geq 1/2$.

Our emphases will be put on the following topics:

(i) To construct a large family of radial positive definite functions including compactly supported ones.

(ii) To construct explicit Riesz sequences on $L^2(\mathbb{R}^n)$.

(iii) To clarify the interconnections among Fourier transforms, Bessel transforms and Laplace transforms.

Based on our investigations, we also consider Laplace-based probability metrics and discuss radial solutions to the Boltzmann equation.

Algebra and Mathematical Education

AM-1

On the quadratic residue codes over rings

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

Quadratic residue codes are cyclic codes of prime length nn defined over a finite field $\mathbb{F}_{p^e}$, where p^e is a quadratic residue mod nn. They comprise a very important family of codes. Quadratic residue codes have rate close to 1/2 and tend to have high minimum distance. Extended quadratic residue codes are self-dual. Examples of quadratic residue codes include the binary [7,4,3] Hamming code, the binary [23,12,7] Golay code and the [11,6,5] ternary Golay code. In this talk we introduce the generalization of quadratic residue codes over p-adic integer rings and Galois rings.

AM-2

A study on 3D printed tactile mathematics textbook for visually impaired students

Kyung-Eun Park*
Sungkyunkwan University, postmedu@skku.edu
Sang-Gu Lee
Sungkyunkwan University

Recently an extensive study of the mathematicians who have overcome the visually impaired and contribute to the academic in math was published. In the case of Korea, we can find there are mathematicians who have overcome physical disabilities such as cerebral palsy and polio. However there is no example of blind person who majored mathematics to become a mathematics teacher or professor and have entered any mathematics related professions. This let us to study the reasons that caused difficulties to visually impaired students majoring in mathematics. We also suggest ways that may help blind students to have access to mathematics intuitively. In this study, we propose a tactile mathematics textbooks and teaching manuals utilizing 3D printing which the visually impaired students can touch and feel. We can supply such materials to visually impaired youth, special education teachers, and parents in Korea. As a result, visually impaired students will be able to access mathematics easily and can build their confidence in mathematics. We hope that some blind students with mathematical talent do not hesitate to major mathematics and choose career in mathematical professions.

AM-3

Some results on piecewise prime rings

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S. Tariq Rizvi
The Ohio State University

The study of prime rings and prime ideals has been an important topic of study in Ring Theory because these notions help provide the description of structures of rings. The notion of piecewise prime rings was introduced by Birkenmeier-Heatherly-Kim-Park in 2000. A quasi-Baer ring is said to be *piecewise prime* (PWP) if the ring has a complete set of triangulating idempotents. It is known that the piecewise prime rings have a general triangular matrix representation with prime rings on the diagonal. Thus, prime rings are building blocks of a PWP ring.

Although it is known that the corner ring of a PWP ring is also a PWP ring when the idempotent is a right (left) semicentral idempotent or full idempotent, whether we do not know that it holds true for a general idempotent until now. In this talk, after we briefly provided the background of PWP rings, we show that every corner ring of a PWP ring is a PWP ring. Also, it is shown that the column (and row) finite matrix ring over a PWP ring is a PWP ring. This talk is based on a joint work with S. Tariq Rizvi.

AM-4

Mobile interactive e-book of Linear Algebra and Engineering Mathematics

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In this talk, we will give an overview of research on using new technology in teaching and learning of Linear Algebra and Engineering Math.

http://matrix.skku.ac.kr/Cal-Book/index.html
http://matrix.skku.ac.kr/LA/
http://www.hanbit.co.kr/EM/sage/
(English Textbook) http://matrix.skku.ac.kr/2015-Album/Big-Book-LinearAlgebra-Eng-2015.pdf
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In particular I will: Describe how technology is more and more integrated in instructional materials, allowing for digital maths books. Emphasize some features of recent digital maths books including Free Lab for Calculus, Linear Algebra and Engineering Math.

AM-5

A group extension problem of the Riordan group

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Sung-Tae Jin
KIAS

We consider two groups, $\mathcal{F}_0 = \{g \in \mathbb{C}[[z]] \mid g(0) \neq 0\}$ under multiplication and $\mathcal{F}_1 = z\mathcal{F}_0$ under composition, where $\mathbb{C}[[z]]$ is the ring of formal power series over the complex field. It is known that the Riordan group RR is isomorphic to the semidirect product $\mathcal{F}_0 \rtimes \mathcal{F}_1$ which is the group extension of $\mathcal{F}_1$ by $\mathcal{F}_0$. In presentation, we show that the extension of the Riordan group $\mathcal{R}$ by $\mathcal{F}_0$ is isomorphic to the group of so called three-dimensional Riordan arrays. This concept enables us to extend to a higher-dimensional Riordan array. As an application, we illustrate the use of the three-dimensional Riordan arrays in some multiple combinatorial sums.

AM-6

Distance Labelings for Some Products of Paths and Cycles

Byeong Moon Kim*
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Byung Chul Song

In this talk, we introduce some recent results on distance labelings for graphs, especially for various products of paths and cycles. $L(j_1, j_2, \cdots, j_d)$-labelings for Cartesian, direct, strong, lexicographic and skew products of paths and cycles are discussed.

AM-7

Mass formula of self-dual codes over Galois rings

Whanhyuk Choi*
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Young Ho Park, Kwang Ho Kim
Kangwon National University

As an application of computer science, coding theory was originated from binary. Sooner or later mathematicians extended it over arbitrary fields. For the last two decades beyond the codes over fields, coding theory is advanced to the codes over rings. One of the motivations is that some good non-linear codes are proved to be viewed as linear codes over Z_4 via gray map. More recently, some papers are published about codes over Galois rings. And self-dual codes are one the of most important classes in the coding theory which give many 'best codes'. In this talk, we introduce the mass formula which will be the corner stone for classifying the codes over Galois rings.

Differential Geometry and Topology

DT-1

On conformal transformations and vector fields

Byung Hak Kim
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In this, talk, we summarize recent results about conformal transformations on Riemannian manifold. Moreover we are to introduce and characterize conformally flat twisted product manifold and concircular scalar fields and concircular vector fields in the Riemannian manifolds.

DT-2

Hyperbolic structure of measure expansive systems

Keonhee Lee
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A notion of measure expansivity for flows was introduced by Carrasco-Olivera and Morales in [1] as a generalization of expansivity, and they proved that there were no measure expansive flows on closed surfaces. In this talk, we introduce a concept of weak measure expansivity for flows which is really weaker than that of measure expansivisty, and show that there is a weak measure expansive flow on a closed surface. Moreover we discuss some recent and ongoing works on the dynamics of flows (or diffeomorphisms) with measure expansivity.

References

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DT-3

Hard Lefschetz property of Hamiltonian circleaction with self-indexing moment map

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Yunhyung Cho
Institute for Basic Science

Let (M, ω) be a $2n$-dimensional closed symplectic manifold equipped with a Hamiltonian circle action with only isolated fixed points, and let $\mu : M \to R$ be a moment map. Then it is well-known that μ is a Morse function whose critical point set coincides with the fixed point set M^{S^1}. Let Λ_{2k} be the set of all fixed points of Morse index $2k$. In this paper, we will show that if μ is constant on Λ_{2k} for each $k \leq n$, then (M, ω) satisfies the hard Lefschetz property. In particular, if (M, ω) admits a self-indexing moment map, i.e. $\mu(z) = 2k$ for every $k \leq n$ and $z \in \Lambda_{2k}$, then (M, ω) satisfies the hard Lefschetz property.

DT-4

Shadowing and topological stability of finitely generated group actions

Sang Jin Kim*
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Woochul Jung
Chungnam National University

In this talk we study shadowing and topological stability of finitely generated group actions which was introduced by N.Chung and K.Lee recently, and investigate some relationship between the dynamics generated by a homeomorphism and the dynamics generated by a finite generated group action on a compact metric space.

DT-5

The development scheme of the military drone

Jaedong Choi
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In order to build a defense system of the unmanned aircraft, to introduce the next. background of military drones appeared, drone current state of the Korean military, preceding conditions for the national defense field activation, the development scheme of national defense use.

Finally, we introduce a process of this project.

DT-6

Flow Modeling and Simulation of Micro Air Vehicle

Sung-Ik Sohn
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In this talk, we present recent development of Micro Air Vehicles (MAV) and discuss the fluid flows of MAV, mainly on the flapping wing aerodynamics. The flow characteristics of MAV, and difficulties and computational issues in the flow analysis are discussed. We also present numerical methods for the simulation of MAV flows.

DT-7

Error estimates for the second order stabilized Gauge-Uzawa method for The Navier-Stokes equations

Jae-Hong Pyo
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The Gauge-Uzawa method [GUM], which is a projection type algorithm to solve the time depend Navier-Stokes equations, has been constructed by Jae-Hong Pyo. Even though GUM possesses many advantages theoretically and numerically, the studies on GUM have been limited on the first order backward Euler scheme except normal mode error estimate for the Stokes equations. The goal of this paper is to research the 2nd order GUM. Because the classical 2nd order GUM needs rather strong stability condition, we modify GUM to be unconditionally stable method using BDF2 time marching. The stabilized GUM is equivalent to the rotational form of pressure correction method and the errors are already estimated only for the Stokes equations.

In this paper, we will evaluate errors of the stabilized GUM for the Navier-Stokes equations. We also prove that the stabilized GUM is an unconditionally stable method for the Naiver-Stokes equations. So we conclude that the rotational form of pressure correction method is also unconditionally stable scheme and that the accuracy are valid for the Navier-Stokes equations.

Numerical Analytics and Applied Mathematics

NA-1

A Fast Solver for Heterogeneous Elliptic Problems

Eun-Hee Park*
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Susanne C. Brenner, Li-Yeng Sung
Louisiana State University

In this talk we will discuss a non-overlapping domain decomposition method (DDM) for a symmetric interior penalty Galerkin (SIPG) method for heterogeneous elliptic problems. The SIPG method is one of the best known discontinuous Galerkin methods for elliptic problems. The proposed DDM is based on balancing domain decomposition by constraints methodology. The performance of DDM as fast iterative solvers is mainly determined by the condition number of the preconditioned problem. In this view the condition number estimate for the proposed method will be presented with corroborating numerical results.

NA-2

Energy Decay rates for solutions of the viscoelastic hyperboric equation with an internal delay term and mixed Dirichlet-Neumann boundary conditions

Daewook Kim
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In this talk, we study the energy decay rates of solutions to the nonlinear hyperbolic equation with an internal delay term and mixed Dirichlet-Neumann boundary conditions. First, we introduce the equivalent the time-delay system which is concerning the main system the main system under the function $z(x, \rho, t) = u_t(x, t - s(t)\rho)$. And we give some assumptions relating nonlinear functions of the main system. By setting the suitable Lyapunov functionals, we can get the analytical results for the energy stability.

NA-3

A Posteriori Error Estimators for Elliptic Interface Problems

Kwang-Yeon Kim
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Elliptic interface problems involve highly discontinuous coefficients between subdomains and arise in many applied areas such as heat conduction, acoustic wave propagation and flud flow in heterogeneous materials and media. It is required that numerical methods for elliptic interface problems should give accurate approximation in a robust way with respect to the large jumps of the coefficient. In particular, the solutions of elliptic interface problems tend to exhibit singularities around the interface, and thus it is imperative to utilize adaptive mesh refinement guided by a posteriori error estimators for efficient implementation of numerical methods. In this talk we present some old and recent results on a posteriori error estimators which are reliable and efficient for elliptic interface problems.

NA-4

On unimodality appearing in 2D Navier-Stokes flows at large Reynolds number

Sun-Chul Kim*
Chung-Ang University, kimsc@cau.ac.kr
Hisashi Okamoto
RIMS, Kyoto University

We study stability and bifurcation of stationary and time-periodic solutions of Kolmogorov's problem for the Navier-Stokes equations in 2D flat tori. Specifically we look for a unimodal solution, which is characterized by having a large, topologically simple pattern of streamlines. We present a conjecture that such simple patterns emerge in steady-states or time periodic solutions at large Reynolds numbers, no matter what the external force may be. We confirm this conjecture by some numerical experiments. Thus the well-noted fact that a large structure appears in 2D large Reynolds number flows is reinforced in another form.

NA-5

Artificial Intelligence Drone's Future

Heechoon kwon
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A.I Drone System is an integrated and automated commercial-grade solution that allows businesses to easily plan drone flights, capture aerial data, and view and share high-resolution maps and surveys of aggregate, security and lost people.

NA-6

The Second-order stabilized Gauge-Uzawa Method for Incompressible Flows with Variable Density

Taek-cheol Kim*
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Jae-Hong Pyo
Kangwon National University

The Navier-Stokes equations with variable density are challenging problems in numerical alnalysis community. Recently, Pyo built the stabilized Gauge-Uzawa method [SGUM] to solve the Navier-Stokes equations with constant density and estimated optimal accuracy. Also Pyo proved that SGUM is unconditionally stable and is equivalent to the pressure correction method.

In this talk, we introduce some algorithms applied SGUM to solve the Navier-Stokes equations with variable density and prove the stability of them. Furthermore, we induce new unconditionally stable algorithm using the Allen-Cahn scheme. Finally, we show the convergence rate of our schemes and numerical simulations of the Rayleigh-Taylor instability.

NA-7

A Uzawa method using singular functions for Stokes equations : corner singularity

Deok-Kyu Jang*
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Jae-Hong Pyo
Kangwon National University

An iteration method called Uzawa method is an approach to find finite element approximation of solutions of the Stokes equations. This method solves velocity variables involving augmented Lagrangian operator and then update pressure variable by Richardson update. Our goal is to construct new version of Uzawa method to find accuracy numerical solution of the Stokes equations including corner singularities. This method is based on dual singular function method [FE-DSFM] which is originally developed by Z. Cai and S. Kim for Laplace problem and recently extended by J. Pyo via using the mixed FEM and Sherman-Morrison formula.

In this talk, firstly we will summarize classical Uzawa method and mixed FEM version of FE-DSFM. To combine singular function method with Uzawa iteration, some ideas will be discussed and numerical results also will be presented.

2016년도 강원경기수학회
정기총회

- 일시 : 2016.6.3(금요일) 18:20 - 18:50
- 장소 : 강릉원주대학교 222호 강당

2016년도 강원경기수학회

정 기 총 회

1. 일　　시 : 2016년 6월 3일 (금요일) 18 : 20 – 18 : 50

2. 장　　소 : 강릉원주대학교 222호 강당

3. 식　　순　　사회 : 부회장

- 개회 ..... 회장
- 임원소개 ..... 총무이사
- 재정보고 ..... 재무이사
- 감사보고 ..... 감사
- 학술지 업무보고 ..... 편집이사
- 업무보고 및 사업계획 보고 ..... 회장
- 학회상 시상 ..... 회장
- 차기회장선거 ..... 회장
- 기타토의사항 ..... 회장
- 폐회 ..... 회장

2016년도 강원경기수학회 감사보고

강원경기수학회의 2015년도 정기총회 이후 (2015. 6. 6)부터 2016년 정기총회 이전(2015. 6. 2)까지의 재정 집행 사항을 감사한 결과 일반회계의 원칙에 따라 적정하게 집행되었음을 보고드립니다.

2016년 6월 3일

강원경기수학회 감사 김 병 학

감사 노 재 옥

2016년도 사업계획

- 2016년도 정기총회 및 연구발표회
  강릉원주대학교 , 6월 3일(금요일) - 6월 4일(토요일)
- 강원경기수학회지(Korean Journal of Mathematics) SCOPUS 등재추친
- 강원경기수학회지 (제 24권 1, 2, 3, 4호) 간행
- 강원경기수학회지를 온라인 학술지와 병행하여 발간
- 강원경기수학회지 편집위원 개편
- 기타 협의 사항

강원·경기지회 수입·지출내역서

산정기간 2015. 6.1 ~ 2016. 5.31

내 용	수 입	지 출
▶ 인건비		6,550,000
▶ 논문인쇄비		2,403,400
▶ 우편비용		537,700
▶ 회의비		688,000
▶ 학회개최 경비		1,258,481
▶ 기타잡비		58,000
▶ 대한수학회 및 과총 지원금	0	
▶ 논문게재료	7,620,000	
▶ 회비	790,000	
▶이자	188,828	
합 계	8,598,828	11,495,581
차 액	-2,896,753	
전년도 이월금	22,635,538	
잔 액	19,738,785	

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