2016 年度
第 1 回 九州大学 組合せ数学セミナー
Hakata Workshop 2017[1]

下記のようにセミナーを開催しますので，ご案内申し上げます。

世話人：　　　溝口 佳寛（九大 IMI）　　渋田 敬史（九大 IMI）
　　　　　　　谷口 哲至（広島工大　　　島袋 修（長崎大）
　　　　　　　田上 真（九州工大）　　　栗原大武（北九州高専）
　　　　　　　千葉周也 (熊本大)
アドバイザー：　坂内 英一（上海交通大学/九大数理）

記

日時: 2017 年 2 月 23 日 (木) 9:18–17:40

場所:Seminar Room I (2F) in Reference Eki Higashi Building. 1-16-14 Hakata-Eki-Higashi, Hakata-Ku, Fukuoka City, 812-0013

プログラム

9:18–9:20 Opening （Tetsuji Taniguchi）

9:20–10:05 Masatake Hirao (Aichi Prefectural University)
QMC designs on the sphere with determinantal point processes

10:10–10:55 Hirotake Kurihara (National Institute of Technology, Kitakyushu College)
Structures of association schemes on great antipodal sets of Hermitian symmetric spaces

11:00–11:30 Tadashi Aramaki (Kyushu University)
On the zeros of certain cusp forms related to the Eisenstein series for the Fricke groups of level 2 and 3

13:00–14:30 Poster Session
Poster Session (Software in Mathematics Demonstration Track in Hakata Workshop 2017)

15:00–15:45 Taichi Kousaka (Kyushu University)
Some properties of highly-regular graphs

15:55–16:40 Takefumi Kondo (Kagoshima University)
Distortion of some finite graphs

16:50–17:35 Semin Oh (Pusan National University)

Demonstrations of finding finite groups all of whose symmetric fusion schemes are integral

17:35–17:40 Closing （Yoshihiro Mizoguchi）

18:00– Post-meeting party

Poster Session

Theme: Software in Mathematics Demonstration Track
Speakers and Titles:

1. Daniel GAINA (Japan Advanced Institute of Science and Technology (JAIST)) Constructor-based Inductive Theorem Prover (CITP)

2. Semin Oh (Pusan National University) Demonstrations of finding finite groups all of whose symmetric fusion schemes are integral

3. 平野 友美 (九州大学大学院 数理学府数理学専攻) A mathematica module for 2-dimensional computer graphics

4. 林 美香 (九州工業大学情報工学府) 5 頂点までの最小ユークリッド歪みについて

5. 小泉 和之 (横浜市立大学国際総合科学部) 客観的指標を用いた投手評価指標の提案

6. Ye Yuan (九州大学大学院 数理学府数理学専攻) Efficient implementation of lattice-based encryption schemes on multiple platforms

Abstract

Masatake Hirao (Aichi Prefectural University)

Title: QMC designs on the sphere with determinantal point processes

Abstract: The concept of a QMC(Quasi-Monte Carlo) design sequence was introduced by Brauchart et al (2014). In this talk we give a probabilistic generation of a sequence of QMC designs by using determinantal point processes (DPPs), which are used in a fermion model in quantum mechanics and also studied in probability theory. We show that spherical ensembles and harmonic ensembles, which are the typical types of DPPs on the sphere, give on average faster convergent sequences for Sobolev space on the sphere.

Hirotake Kurihara (National Institute of Technology, Kitakyushu College)

Title: Structures of association schemes on great antipodal sets of Hermitian symmetric spaces

Abstract: For a compact Hermitian symmetric space, there is a "good" finite subset, which is called a great antipodal set. In this talk, we will show that each great antipodal set has a structure of an association scheme. This is a joint work with Takayuki Okuda (Hiroshima University).

Tadashi Aramaki (Graduate school of mathematics, Kyushu University)

Title: On the zeros of certain cusp forms related to the Eisenstein series for the Fricke groups of level 2 and 3.

Abstract: The location of the zeros of Eisenstein series has been considered for a long time. It is known that the zeros of Eisenstein series for SL(2,Z) in the standard fundamental domain lie on the lower arc of it. In this talk, we will present several results for the location of the zeros of certain cusp forms related to the Eisenstein series for the Fricke groups of level 2 and 3.

Taichi Kousaka (Graduate school of mathematics, Kyushu University)

Title: Some properties of highly-regular graphs

Abstract: Classically, highly-regular graphs have been studied as a generalization of strongly-regular graphs. However, highly-regular graphs can also be regarded as a generalization of distance-regular graphs. From this view point, we study combinatorial and spectral aspects of highly-regular graphs. In this talk, as combinatorial results, we give two constructions of highly-regular graphs and some properties of CAM (collapsed adjacency matrix) of highly-regular graphs. Furthermore, we show that highly-regular graphs are spectrally-regular graphs.

Takefumi Kondo (Department of Mathematics and Computer Science, Kagoshima University)

Title: Distortion of some finite graphs

Abstract: Using duality theory of semidefinite programming, Linial, London and Rabinovich obtained a characterization of the least possible distortion of embeddings of finite metric spaces into Euclidean space. I will describe how this result is applied to determine the Euclidean distortion of finite generalized polygons in a joint work with Toshimasa Kobayashi and then discuss other methods to compute the least distortion for embeddings into CAT(0) spaces.

Semin, Oh (Pusan National University)

Title: Demonstrations of finding finite groups all of whose symmetric fusion schemes are integral

Abstract: Let X be a finite set with size n and $S = \{A_0, \ldots, A_m\}$ a set of $(0, 1)$-matrices indexed by X. We say that the pair (X, S) is an *association scheme* (or shortly *scheme*) if it satisfies the following conditions:

(i) $\sum_k A_k = J$, where J is the $n \times n$ all-one matrix,

(ii) $A_0 = I_n$, where I_n is the $n \times n$ identity matrix,

(iii) For any A in S, the transpose matrix A^t of A is in S,

(iv) For any A_i, A_j in S, $A_i A_j = \sum_k p_{ij}^k A_k$ for some constants p_{ij}^k.

A scheme (X, S) is called *symmetric* if $A = A^t$ for all A in S and *integral* if every matrix in S has only integral eigenvalues. A scheme (X, T) is called *fusion scheme* of (X, S) if for any matrix in T it is a sum of some matrices in S.

It is well-known that for a finite group G the association scheme of G can be obtained by its regular action. In this talk a finite group G is called *desiarable* if for any symmetric fusion scheme of the association scheme of G is integral. Observing the one-to-one correspondence between the set of fusion schemes of the association scheme of G and the set of Schur rings over G, we will give demonstrations of finding finite desirable groups of small order by using GAP with COCO2p package.