

The 4th International Coding Theory Seminar (4th ICTS)

Korea (online)

September 27, 2024

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Patrick Sole (France)
Hong-Yeop Song (Korea)
Chaoping Xing (China)

Local organizing committee

Boran Kim (Kyungpook National University, Korea)
Jon-Lark Kim (Sogang University, Korea)

Program

All times listed are in Korea Time (GMT+9).

Date: September 27, 2024

Time	Activities	
14:00–15:00	Committee Discussion	
15:00–15:45	Patrick Solé Institut de Mathématiques de Marseille, Marseilles, France	Hadamard matrices and spherical designs
15:45–16:00	Discussion	
16:00–16:45	Boran Kim Kyungpook National University, Korea	Linear codes over pseudo-chain rings
16:45–17:00	Discussion	
17:00–17:10	Break	
17:10–17:55	Jon-Lark Kim Department of Mathematics Sogang University, Korea and Institute for Mathematical and Data Sciences, Sogang University	Fuzzy Linear Codes and Some Problems
17:55–18:10	Discussion	

Talk 1: Hadamard matrices and spherical designs

Patrick Solé

(Joint work with Minjia Shi, Danni Lu, A. Armario, R. Egan, F. Ozbudak)

Institut de Mathématiques de Marseille, Marseilles, France

Hadamard codes over finite rings are explored wrt their covering radius for the chinese euclidean distance. Generalized bent sequences, when they exist, provide a lower bound. Upper bounds are obtained by considering a spherical code attached to Hadamard matrices of Butson type. Under mild hypotheses, this code is spherical 2-design, which yields upper bound on its covering radius on the sphere. This bound, in turn, gives an upper bound on the covering radius of the Hadamard codes.

Talk 2: Linear codes over pseudo-chain rings

Boran Kim

Kyungpook National University, Korea

In this talk, we introduce a class of local rings, termed pseudo-chain rings, and demonstrate that, when limited to finite rings, they correspond to pseudo-valuation rings. We further explore the ring-theoretic structures of these rings. A notable example, the NPC-ring, is presented as a pseudo-chain ring that is not a chain ring. We then examine the properties of ideals arising from a specific type of ring based on an NPC-ring. Finally, we apply these findings to investigate cyclic and negacyclic codes over a particular ring. This is joint work with Hyun Seung Choi (Kyungpook National University).

Talk 3: Fuzzy Linear Codes and Some Problems

Jon-Lark Kim

Sogang University, Korea

In this talk, we introduce an interesting connection between coding theory and fuzzy set theory. We show that there is a correspondence between a fuzzy linear code and a family of nested linear codes. We also describe the arithmetic of fuzzy linear codes. As a special class of nested linear codes, we consider a family of nested self-orthogonal codes. We introduce a definition of fuzzy self-dual or self-orthogonal codes which include classical self-dual or self-orthogonal codes. As examples, we construct several interesting classes of fuzzy linear codes including fuzzy Hamming codes, fuzzy Golay codes, and fuzzy Reed Muller codes. Finally we propose some future problems.

