Keita Ishizuka 石塚 慶太

Research Associate, Mitsubishi Electric Corporation — Information Technology R&D Center. Ph.D. in Information Science, Tohoku University (2024). Nationality: Japanese.

keitaishizuka1994@gmail.com · keitaishizuka.com · ORCID 0000-0001-5943-6245 · Google Scholar

RESEARCH INTERESTS

Algebraic coding theory · classification and construction of LCD, self-dual and self-orthogonal codes · post-quantum cryptography · combinatorial design theory and Hadamard matrices · insertion–deletion codes for DNA data storage.

APPOINTMENTS

2024 – **Research Associate**, Mitsubishi Electric Corporation, Information Technology R&D Center
Post-quantum cryptography, code-based security

RESEARCH VISITS

2026 **University of Lethbridge**, Canada
Jul – Dec 2026 · Supported by KAKENHI JP25KK0004 (own grant) · Host: Prof. Hadi Kharaghani

2023 **University of Lethbridge**, Canada
Sep – Nov 2023 · Tohoku University Graduate Program in Data Science (GP-DS) · Host: Prof. Hadi Kharaghani

EDUCATION

2021 – 2024 **Ph.D. in Information Science**, Tohoku University

2019 – 2021 **M.S. in Information Science**, Tohoku University

2013 – 2019 **B.Eng.**, Tohoku University

JOURNAL ARTICLES

[J8] **Constructions of self-orthogonal and LCD subspace codes**
Dean Crnković, **Keita Ishizuka**, Hadi Kharaghani, Sho Suda, Andrea Švob
Discrete Mathematics, 349(6), Art. 115066 (2026) doi:10.1016/j.disc.2026.115066 · arXiv:2407.05695

[J7] **Characterizations of the minimum weights of LCD codes of large dimensions**
Makoto Araya, Masaaki Harada, **Keita Ishizuka**, Yuto Tanaka
IEEE Transactions on Information Theory, 70(12), pp. 8758–8769 (2024) doi:10.1109/TIT.2024.3483218

[J6] **Ternary Extremal Four-Negacirculant Self-Dual Codes**
Masaaki Harada, **Keita Ishizuka**, Hadi Kharaghani
Graphs and Combinatorics, 40(3) (2024) doi:10.1007/s00373-024-02788-3 · arXiv:2306.10451

[J5] **Hadamard matrices of order 36 formed by codewords in some ternary self-dual codes**
Masaaki Harada, **Keita Ishizuka**
Discrete Mathematics, 347(1), Art. 113661 (2024) doi:10.1016/j.disc.2023.113661 · arXiv:2303.05056

[J4] **Construction of quaternary Hermitian LCD codes**
Keita Ishizuka
Cryptography and Communications, 15(2), pp. 455–467 (2023) doi:10.1007/s12095-022-00614-2 · arXiv:2207.00801

[J3] **Construction for both self-dual codes and LCD codes**
Keita Ishizuka, Ken Saito
Advances in Mathematics of Communications, 17(1), pp. 139–151 (2023) doi:10.3934/amc.2021070 · arXiv:2108.12544

[J2] **On the existence of quaternary Hermitian LCD codes with Hermitian dual distance 1**
Keita Ishizuka, Ken Saito
Discrete Mathematics, 345(2), Art. 112702 (2022) doi:10.1016/j.disc.2021.112702 · arXiv:2104.07432

[J1] **Classification of optimal quaternary Hermitian LCD codes of dimension 2**
Keita Ishizuka
Journal of Algebra Combinatorics Discrete Structures and Applications, 7(3), pp. 229–236 (2020) doi:10.13069/jacodesmath.790748 · arXiv:2004.07059

REFEREED CONFERENCE PROCEEDINGS

[C2] **Bilinear Hulls for Support Splitting: Characterization, Optimization, and Applications**
Yusuke Aikawa, **Keita Ishizuka**, Tomoki Moriya
SAC 2026 (Selected Areas in Cryptography), Springer LNCS post-proceedings (2026) arXiv:2611.01337

[C1] **Uniform Sampling of Self-Orthogonal Codes via Orthogonal Group Actions**
Keita Ishizuka
IEEE Information Theory Workshop (ITW) 2026, Tempe (2026)

POSTERS

[P2] **Exactly Uniform Sampling of Entanglement-Assisted Quantum Codes with a Prescribed Number of Ebits**
Keita Ishizuka
QIP 2027 (30th Conference on Quantum Information Processing), Singapore (2027)

[P1] **Poster: Reducing Hull Dimensions for Efficient Permutation Recovery in Code-Based Cryptography**
Keita Ishizuka
Proceedings of the 2025 ACM SIGSAC Conference on Computer and Communications Security (CCS 2025), pp. 4812–4814 (2025) doi:10.1145/3719027.3760735

PREPRINTS

Almost All Vectorial Functions Have Trivial Extended-Affine Stabilizers
Keita Ishizuka
(2026) under review · arXiv:2602.06668

The Closure of LCD-to-GI Reductions via Generalized Inner Products
Keita Ishizuka
(2026) under review · arXiv:2605.23120

Caps and LCD Codes with Large Dimensions
Keita Ishizuka, Yuhi Kamio
(2026) under review · arXiv:2604.03734

Uniform Sampling of Linear Codes with Prescribed Hull Dimension
Keita Ishizuka
(2026) arXiv:2611.03578

Enumeration and Monotonicity of Linear Codes with Prescribed Hull Dimensions
Stefka Bouyuklieva, Iliya Bouyukliev, **Keita Ishizuka**, Ferruh Özbudak
(2026) submitted · arXiv:2605.29204

Classification of binary, ternary and quaternary Hermitian LCD codes
Keita Ishizuka
(2026) submitted · arXiv:2610.30561

Binary LCD Codes and Their Graph Representations
Keita Ishizuka
(2024) under review · arXiv:2407.07689

RESEARCH FUNDING

Dec 2026 – Mar 2029 **Foundations of Small-Alphabet Insertion-Deletion Correcting Codes for DNA Data Storage**
ATLA Innovative Science and Technology Initiative for Security, Type C — Principal Investigator

Apr 2026 – Mar 2029 **Elucidating the Relationships between Codes, Graphs, and Hadamard Matrices**
KAKENHI Fund for the Promotion of Joint International Research (Fostering Joint International Research) (JP25KK0004) — Principal Investigator

Apr 2025 – Mar 2028 **Elucidating the Relationships between Graph and Code Invariants**
Grant-in-Aid for Early-Career Scientists (KAKENHI) (JP25K17290) — Principal Investigator

Jul 2024 – Mar 2026 **Development and Security Evaluation of Post-Quantum Cryptography Using Coding Theory**
Grant-in-Aid for Research Activity Start-up (KAKENHI) (JP24K23876) — Principal Investigator

PUBLISHED DATASETS

Classification of LCD codes over F_2, F_3 and F_4
10 records, Zenodo, CC-BY-4.0 doi:10.5281/zenodo.23990903

Simple graphs with idempotent adjacency matrices over F_2 on at most 19 vertices
1 record, Zenodo, CC-BY-4.0 doi:10.5281/zenodo.23988490

Construction data for binary LCD codes of codimension 8
1 record, Zenodo, CC-BY-4.0 doi:10.5281/zenodo.23486097

CONTRIBUTED TALKS

[T9] **On extended-affine symmetries of vectorial Boolean functions**
Keita Ishizuka
2026 Symposium on Cryptography and Information Security (SCIS 2026) (2026)

[T8] **Speeding up the support splitting algorithm using bilinear forms**
Yusuke Aikawa, **Keita Ishizuka**, Tomoki Moriya
2026 Symposium on Cryptography and Information Security (SCIS 2026) (2026)

[T7] **On largest minimum weights of binary LCD codes**
Keita Ishizuka
41st Symposium on Algebraic Combinatorics (2025)

[T6] **On weak keys in SPN block ciphers via the correlation matrix**
Keita Ishizuka, Kosei Sakamoto, Rentaro Shiba
2025 Symposium on Cryptography and Information Security (SCIS 2025) (2025)

[T5] **Orthogonal projectors of binary LCD codes**
Keita Ishizuka
Finite Group Theory, Algebraic Combinatorics and Vertex Algebras (2024)

[T4] **Orthogonal projectors of binary LCD codes**
Keita Ishizuka
New Constructions of Expander Graphs and Their Applications 3 (2024)

[T3] **Construction and characterization of LCD codes**
Keita Ishizuka
39th Symposium on Algebraic Combinatorics (2023)

[T2] **Construction of quaternary Hermitian LCD codes**
Keita Ishizuka
Joint Research Meeting on Applied Mathematics 2022 (2022)

[T1] **Classification of optimal quaternary Hermitian LCD codes of dimension 2**
Keita Ishizuka
Workshop on Discrete Mathematics and Its Applications 2020 (2020)

SEMINARS

[S1] **Linear complementary dual codes and its applications**
Keita Ishizuka
Topology and Geometry Seminar, Hiroshima University (2025)

OTHER PUBLICATIONS

DNA Data Storage Technology Review (Japanese translation)
Takaki Nakamura, **Keita Ishizuka**, Yuichi Aoki
DNA Data Storage Alliance / SNIA Japan (2026)

SERVICE

Referee for Advances in Mathematics of Communications, Computational and Applied Mathematics, Finite Fields and Their Applications and Journal of Applied Mathematics and Computing.

LANGUAGES

Japanese (native) · English (professional working proficiency).