

## Abstract

# On the fractal dimension of strongly isotopism classes of Latin squares

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Based on an iterative construction of pseudo-random sequences, Dimitrova and Markovski [1] described a graphical representation of quasigroups by means of image patterns with a certain fractal character. It is so that one may distinguish among fractal and non-fractal quasigroups. In the literature, the former are recommended for designing error detecting codes, whereas the second ones play a relevant role for designing cryptographic primitives. Furthermore, the analysis and recognition of these fractal image patterns have recently turned out to be an efficient way to distinguish isomorphism classes of non-idempotent Latin squares [2, 3]. This talk delves into this topic by introducing the concept of  $(s, t)$ -standard set of image patterns associated to a quasigroup. The mean fractal dimension of these standard sets constitutes a new strongly isotopism invariant, which enables one to characterize in an efficient way distinct strongly isotopism classes of Latin squares, even if they are idempotent.

## References

- [1] V. Dimitrova, S. Markovski, *Classification of quasigroups by image patterns*. In: Proceedings of the Fifth International Conference for Informatics and Information Technology, Bitola, Macedonia, 2007; 152–160.
- [2] R. M. Falcón, *Recognition and analysis of image patterns based on Latin squares by means of Computational Algebraic Geometry*, Mathematics **9** (2021), paper 666, 26 pp.
- [3] R. M. Falcón, V. Álvarez, F. Gudiel, *A Computational Algebraic Geometry approach to analyze pseudo-random sequences based on Latin squares*, Adv. Comput. Math. **45** (2019), 1769–1792.