Characterizing isomorphism classes of Latin squares by fractal dimensions of image patterns

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Based on the construction of pseudo-random sequences arisen from a given Latin square, Dimitrova and Markovski [1] described in 2007 a graphical representation of quasigroups by means of fractal image patterns. The recognition and analysis of such patterns have recently arisen [2,3] as an efficient new approach for classifying Latin squares into isomorphism classes. This talk delves into this topic by focusing on the use of the differential box-counting method for determining the mean fractal dimension of the homogenized standard sets associated to these fractal image patterns. It constitutes a new Latin square isomorphism invariant which is analyzed in this talk for characterizing isomorphism classes of non-idempotent Latin squares in an efficient computational way.

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.