Centro de Investigação em Matemática e Aplicações
Departamento de Matemática
Programa de Doutoramento em Matemática

Seminário
3/5/2023, **CLAV-Anfiteatro 1, 15h**

Disaggregations of sums of squares for treatments using multialphabetic hypercubes

Carla Francisco

Universidade de Évora

Abstract: This research focuses on developing a complete disaggregation of squares sums for treatments in experimental designs through the use of multialphabetic hypercubes constructed on vector spaces of Galois Fields, [1]. Multialphabetic hypercubes also known as Vigenère squares, are a type of cryptogram based on polyalphabetic letter substitution. They were invented by the French cryptographer Blaise de Vigenère in the 16th century, [2]. These hypercubes are an extension of Greco-Latin squares to higher dimensions and are used for randomized systematic sampling on continuous media. The dimension of a hypercube is determined by the number of factors considered to have prime levels. Algorithms were also developed to decompose the sum of squares for treatments into the effects and interactions of the factors. By using hypercubes, structured series of designs are obtained through nesting, with treatments defined by the crossing of v factors with p prime levels and u external factors with p levels. This approach allows for the study of the effects and interactions of both internal and external factors, unlike traditional designs that only consider internal factors. The use of factors with prime levels enables multilevel nesting, which can facilitate the implementation of designs in the network.

References:
[1] Lidl, R., & Niederreiter, H. (1997). Finite Fields Cambridge University Press.
[2] Vigenère, B. (1586). Traicté des chiffres ou secrètes manières d'écrire. Chez Blaise de Vigenère.