

Polycyclic Codes over Finite Commutative Local Rings: from Simple-root to Repeated-root

Maryam Bajalan

Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, Bulgaria

Cyclic codes have also been generalized in numerous ways. In this presentation, we aim to provide a comprehensive generalization of these code families known as "polycyclic codes". A notable limitation of polycyclic codes is that their Euclidean duals are typically not polycyclic codes. To address this challenge, some researchers have proposed an alternative duality concept for polycyclic codes over finite fields. In our approach, we will utilize the powerful Mattson Solomon transform to resolve this issue when the alphabet is local rings. In our exploration of polycyclic codes, we will categorize them into two main groups: simple-root polycyclic codes and repeated-root polycyclic codes. While the former has received relatively fewer references, especially when considering alphabets as fields, the second is more difficult and has not been discussed at all. Our presentation will delve into both categories, aiming to establish a deeper understanding of them. To achieve this, we will investigate the relationship between simple-root and repeated-root polycyclic codes through the application of the Mattson Solomon transforms. Moreover, we will describe repeated-root polycyclic codes over fields and their duals as the matrix product of simple-root polycyclic codes.