Unramified abelian covers with many points

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Résumé

Algebraic geometry (AG) codes are well-known to have good parameters when they are defined over algebraic curves with many rational points compared to their genus, a geometric invariant of the curve. Previous work showed that one can construct quasi-group codes, a family of linear codes generalizing quasi-cyclic codes, as AG codes defined over a Galois cover of an algebraic curve. Quasi-group codes possess a particular algebraic structure, useful in many applications. In this presentation, we will be interested in finding Galois covers of algebraic curves with many points relatively to their genus, that define quasi-group AG codes with good parameters. We will present a method for producing unramified abelian covers with many points, relying on class field theory, and we will apply it to obtain curves with a record number of points over the finite fields with 4, 9, 16 and 25 elements.

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