AG codes from Galois subcovers of the Hermitian curve

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A (projective, geometrically irreducible, non-singular) curve $\mathcal{X}$ defined over a finite field $\mathbb{F}_{q^2}$ is *maximal* if the number N_{q^2} of its $\mathbb{F}_{q^2}$-points attains the Hasse-Weil upper bound, that is $N_{q^2} = q^2 + 2\mathfrak{g}q + 1$ where $\mathfrak{g}$ is the genus of $\mathcal{X}$. An important question, also motivated by applications to algebraic-geometry codes, is to find explicit equations for maximal curves. For curves which are Galois covered of the Hermitian curve, this has been done so far ad hoc, in particular in the cases where the Galois group has prime order. In this talk we show explicit equations of all Galois covers of the Hermitian curve with Galois group of order p^2 where p is the characteristic of $\mathbb{F}_{q^2}$. Since the basic structure in the theory of *AG codes* are the algebraic curves over a finite field, we show a case constructed from one of the previous explicit equations of a Galois subcovers of the Hermitian curve where the minimum distance d of the code is better then the Goppa's lower bound.

References

[1] B. Gatti, G. Korchmáros, *Galois subcovers of the Hermitian curve in characteristic p with respect to subgroups of order p^2*, http://arxiv.org/abs/2307.15192, (2023).