Vardøhus codes: Polar codes based on Castle curves

EDGAR MARTÍNEZ-MORO

Institute of Mathematics
University of Valladolid

edgar.martinez@uva.es

Abstract. In this contribution we explore the idea of employing algebraic geometric codes to produce kernels of polar codes. The idea is not new and it can be find in [1] and the references therein. Castle curves and Castle codes [2] seem to be well suited for the desing of such kernels.

Based on the definition of additive channels over the alphabeth $\mathbb{F}_q$ (the finite field of $q = p^r$ elements with p a prime number) we analyze the properties of polar codes whose kernel is given by codes over pointed curves $(\mathcal{X}, Q)$. We defined the concept of extrict decreasing code that allows us to control some parameters of the code. It turns that for the case of Castle curves the kernel associate to its dual is isometric to a extrict decreasing code. This fact allows us to control new kernels obtained by punturing the code.

References

[1] Anderson, S. E., & Matthews, G. L. (2014). Exponents of polar codes using algebraic geometric code kernels. Designs, codes and cryptography, 73(2), 699–717.

[2] C. Munuera, A. Sepulveda, F. Torres (2008), Algebraic geometry codes from Castle curves, in: A. Barbero (Ed.), Coding Theory and Applications, in: Lecture Notes in Comput. Sci., vol. 5228, Springer-Verlag, Berlin, pp. 117–127.

––––––––––––