

On Puncturing of Codes from Norm-Trace Curves

Constructing new codes from existing ones by puncturing is in this paper viewed in the context of order domains R where puncturing can be seen as redefinition of the evaluation map $\varphi : R \rightarrow \mathbb{F}_q^n$. The order domains considered here are on the form $R = \mathbb{F}[x_1, x_2, \dots, x_m]/I$ where redefining φ can be done by adding one or more polynomials to the basis of the defining ideal I to form a new ideal J in such a way that the number of points in the variety $\mathbb{V}(I)$ is reduced by t to form $\mathbb{V}(J)$ and puncturing in t coordinates is achieved. An explicit construction of such polynomials is given in the case of codes defined by Norm-Trace curves and examples are given of both evaluation codes and dual codes. Finally, it is demonstrated that the improvement in minimum distance can be significant when comparing to the lower bound obtained by ordinary puncturing.