

“Superregular matrices over small finite fields”

Abstract: Several notions of superregular (or totally positive) matrices have appeared in different areas of mathematics and engineering, having in common the specification of some properties regarding their minors. In the context of Coding Theory these matrices have entries in a finite field F and are important because they can be used to generate linear codes with optimal distance properties. For us, a matrix is superregular if all of its minors that are not trivially zero are nonzero. Superregular matrices with no zero entries are well understood and concrete constructions over small fields are known, e. g. Cauchy matrices. There also exist a few general constructions of superregular matrices having a lower triangular Toeplitz structure, but all of them require very large field sizes. In this work we study the existence and construction of lower triangular Toeplitz superregular matrices over small finite fields. For instance, given the order of a matrix, we investigate the size of the smallest finite field for which it is possible to obtain such matrices.

Trabajo conjunto con Diego Napp.

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