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Maximal Arcs and Maximal-length A^{s}MDS Codes: Existence and Obstructions

We investigate the existence of linear codes whose parameters meet the maximum possible length for a given Singleton defect $s \geq 1$—so-called A^{s}MDS codes. We survey known existence results for maximal-length A^{s}MDS codes in small dimensions, highlighting dimensions 2 and 3, including the Barlotti condition that $s+2$ divides q. For higher-dimensional projective spaces maximal codes do not exist when $s > q$, while constructions exist for special cases such as $s = q-1$ and $s = q-2$ when $k \leq 4$.

Long A^{s}MDS codes are necessarily projective and dual to AMDS codes, and we develop arithmetic conditions that restrict the possible existence of such codes. The talk concludes with a summary of bounded values of $\kappa(s,q)$ - the maximum dimension for which there (may) exist maximal-length A^{s}MDS codes and provide (and perhaps settle) conjectures.