

Partial t -spreads and minimal t -covers in finite classical polar spaces

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Abstract. A t -spread of a finite classical polar space $\mathcal{P}$ is a set of t -spaces of this polar space $\mathcal{P}$, partitioning the point set of $\mathcal{P}$. A *partial t -spread* of a finite classical polar space $\mathcal{P}$ is a set of pairwise disjoint t -spaces of $\mathcal{P}$. A *maximal* partial t -spread of $\mathcal{P}$ is a partial t -spread of $\mathcal{P}$, which is not properly contained in a larger partial t -spread of $\mathcal{P}$.

A t -cover $\mathcal{C}$ of a finite classical polar space $\mathcal{P}$ is a set of t -spaces of this polar space $\mathcal{P}$, such that every point of $\mathcal{P}$ belongs to at least one t -space of $\mathcal{C}$. A t -cover $\mathcal{C}$ of a finite classical polar space $\mathcal{P}$ is *minimal* when no proper subset of $\mathcal{C}$ still is a t -cover of $\mathcal{P}$.

For $(t + 1)|n$, we present constructions of partial t -spreads of the parabolic quadrics $Q(2n + 2, q)$, q even. When $t > q$, the constructed partial t -spreads of $Q(2n + 2, q)$, q even, are of the largest possible size.

We also investigate the largest possible size for partial t -spreads of the hyperbolic quadrics $Q^+(2n + 1, q)$, under the condition $(t + 1)|n$.

Furthermore, (1) t -covers of $Q^+(2n + 1, q)$, q even, $(t + 1)|n$, of minimum size were constructed, and (2) minimal $2n$ -covers of $Q^+(4n + 1, q)$, q even, were investigated.

Keywords: Finite Classical Polar Spaces, Partial t -spreads, Minimal t -covers.

References

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