On characterization of the Grassmann graphs $J_2(2d + 2, d)$

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The Grassmann graph $J_q(n, d)$, $n \geq 2d$, is a graph (of diameter $d$) defined on the set of $d$-dimensional subspaces of an $n$-dimensional vector space over the finite field $\mathbb{F}_q$, with two subspaces being adjacent if their intersection has dimension $d - 1$.

In 1995, Metsch [1] showed that a distance-regular graph with the same intersection array as $J_q(n, d)$ is indeed $J_q(n, d)$ unless $n = 2d$, $n = 2d + 1$, $(n = 2d + 2$ if $q \in \{2, 3\}$), or $(n = 2d + 3$ if $q = 2)$.

In 2005, Van Dam and Koolen [2] constructed the twisted Grassmann graphs, a family of distance-regular graphs with the same intersection array as $J_q(2d + 1, d)$, but not isomorphic to them, for all prime powers $q$ and $d \geq 2$.

In 2015, the authors showed that the Grassmann graph $J_2(2d, d)$ can be characterized by its intersection array, if the diameter $d$ is an odd number or large enough.

In this talk, we will discuss a characterization of the Grassmann graphs $J_2(2d + 2, d)$.

References
