On the Size of Unions of Lines in Fn Obeying the Wolff Axiom

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The paper deals with finding unions of lines in n-dimensional vector spaces over finite fields which obey the Wolff axiom and have minimal size. We provide an extension of the constructions for three-dimensional vector spaces over finite fields of even prime power order, obtained by Tao in 2002, to a construction for n-dimensional vector spaces. We determine the size of the union of lines in our construction in n-dimensional vector spaces over finite fields of even prime power order to be O(p^{1.6kn}) where p^(2k) is the order of the field. We prove that our construction obeys the Wolff axiom up to a heuristically negligible number of lines.

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