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An application of random plane slicing to counting $\mathbb{F}_q$-points on hypersurfaces. (English) Zbl 1390.14068

Author’s abstract: Let $X$ be an absolutely irreducible hypersurface of degree $d$ in $\mathbb{A}^n$, defined over a finite field $\mathbb{F}_q$. The Lang-Weil bound gives an interval that contains $\#X(\mathbb{F}_q)$. We exhibit an explicit interval, which does not contain $\#X(\mathbb{F}_q)$, and which overlaps with the Lang-Weil interval. In particular, we sharpen the best known nontrivial lower bound for $\#X(\mathbb{F}_q)$. The proof uses a combinatorial probabilistic technique.

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MSC:
14G15 Finite ground fields in algebraic geometry
14J70 Hypersurfaces and algebraic geometry
11G25 Varieties over finite and local fields

Keywords:
hypersurface; Lang-Weil bound; Bertini’s theorem; random sampling

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References:

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