

Title: Bilinear character sums over norm groups

Author(s): Su Hu and Yan Li

Let k be a finite field with q elements. Let k_n be the extension of k with degree n . Let N_n be the kernel of the norm map $N_{k_n/k} : k_n^\times \rightarrow k^\times$. In this paper we estimate the bilinear character sum

$$W_{\rho, \theta}(\psi, \mathcal{U}, \mathcal{V}) = \sum_{U \in \mathcal{U}} \sum_{V \in \mathcal{V}} \rho(U) \theta(V) \psi(UV),$$

where \mathcal{U} and \mathcal{V} are arbitrary subsets of N_n , $\rho(U)$ and $\theta(V)$ are arbitrary bounded complex functions supported on \mathcal{U} and \mathcal{V} and ψ is a nontrivial additive character of k_n . We apply this bound to two problems.

- (1) If $\mathcal{S}, \mathcal{T}, \mathcal{U}, \mathcal{V}$ are subsets of N_n , we study the equation $S + T = UV$, where $S \in \mathcal{S}, T \in \mathcal{T}, U \in \mathcal{U}, V \in \mathcal{V}$.
- (2) We study the N_n analogy of the sum-product problem.

Address:

Su Hu
Department of Mathematical Sciences
Tsinghua University
Beijing 100084
China

Address:

Yan Li
Department of Mathematical Sciences
Tsinghua University
Beijing 100084
China