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THE DISTRIBUTION OF $\alpha p^{\gamma} + \beta$ MODULO ONE AND r-FREE NUMBERS

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ABSTRACT

Let $\alpha, \beta \in \mathbb{R}$ be given. Assume that $a_1, a_2, \ldots, a_n$ are distinct positive integers and let $\mathcal{P}$ be the infinite set of prime numbers for which $a_1, a_2, \ldots, a_n$ does not form a reduced residue system modulo p^r, $r > 2$ for any $p \in \mathcal{P}$. For any fixed γ with $0 < \gamma < 1$, we prove that there are infinitely many primes $p \in \mathcal{P}$ such that $||\alpha p^{\gamma} + \beta|| < p^{-\theta}$ and all the numbers $p + a_1, \ldots, p + a_s$ are free of rth powers.

Keywords Distribution modulo one · r-free numbers · esti-mates of exponential sums

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