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The Complex Sum of Digits Function and Primes

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Abstract. Canonical number systems in the ring of Gaussian integers $\mathbb{Z}[i]$ are the natural generalization of ordinary q-adic number systems to $\mathbb{Z}[i]$. It turns out, that each Gaussian integer has a unique representation with respect to the powers of a certain base number b. In this paper we investigate the sum of digits function ν_b of such number systems. First we prove a theorem on the sum of digits of numbers, that are not divisible by the f-th power of a prime. Furthermore, we establish an Erdős-Kac type theorem for ν_b. In all proofs the equidistribution of ν_b in residue classes plays a crucial rôle. Starting from this fact we use sieve methods and a version of the model of Kubilius to prove our results.

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