

Odlyzko, A. M.; Poonen, B.

Zeros of polynomials with 0,1 coefficients. (English) Zbl 0814.30006
Enseign. Math. (2) 39, No. 3-4, 317-348 (1993).

Let us consider the $P = \{f(z) : f(z) = 1 + \sum_{j=1}^d a_j z^j, a_j = 0 \text{ or } 1\}$ and define $W = \{z \in \mathbb{C} : f(z) = 0 \text{ for some } f \in P\}$. The authors have obtained several interesting results about the set \overline{W} . The set $\overline{W} \cap \{z : |z| < 1\}$ is the set of zeros of power series $f(z) = \sum_{k=1}^{\infty} a_k z^k, a_k = 0 \text{ or } 1$. Since $1/z \in W$ for all $z \in W$, it is sufficient to study $z \in W, |z| \leq 1$, and in some ways it is more natural to deal with the above power series.

Applying Jensen's theorem, the authors prove that for any $0 < r < 1$, the power series $f(z)$ has $\leq 2(\log(1 - \sqrt{r})/(-\log r))$ zeros in $|z| \leq r$. Also the bounds on the size of $z \in W$ were obtained. The set \overline{W} is connected and path connected and there is an open neighborhood of $\{z : |z| = 1, z \neq 1\}$ contained in \overline{W} . These results are based on several interesting topological lemmas.

The paper contains remarkable pictures which illustrate the theoretical results and as well as the description of the computational algorithms needful for plotting of these pictures.

Reviewer: [A.Klíč \(Praha\)](#)

MSC:

- [11C08](#) Polynomials in number theory
- [11Y35](#) Analytic computations
- [12D10](#) Polynomials in real and complex fields: location of zeros (algebraic theorems)
- [30C15](#) Zeros of polynomials, rational functions, and other analytic functions of one complex variable (e.g., zeros of functions with bounded Dirichlet integral)

Cited in **3** Reviews
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Keywords:

[Roche's theorem](#); [multiset](#); [path connected set](#); [Jensen's theorem](#)