

ON THE DISTRIBUTION OF ZEROS OF BICOMPLEX POLYNOMIALS

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Abstract: Bicomplex numbers are a modern generalization of complex numbers in four-dimensional settings. In this study, we derive a region containing all zeros of a bicomplex polynomial. Furthermore, we provide some examples to validate the obtained results.

Keywords and Phrases: Bicomplex number, zero, polynomial.

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1. Introduction

The process of finding all the zeros of a higher-degree polynomial is much more difficult; therefore, it is desirable to find a region where the zeros will lie. This study in the field of complex numbers began a long time ago with the Fundamental Theorem of Algebra. The Fundamental Theorem of Algebra only gives information about the number of zeros in a polynomial but not about the location of the zeros. The problem of finding a region containing all the zeros of a polynomial in the field of complex numbers \mathbb{C} have a rich old history [26]. In 1829, Cauchy [26] introduced the following classical result.

Theorem A. [26] *If $P(z) = \sum_{t=0}^n a_t z^t$ is a polynomial of degree n in \mathbb{C} with complex coefficients, then all the zeros of $P(z)$ lie in $|z| \leq 1 + \max_{0 \leq t \leq (n-1)} \left| \frac{a_t}{a_n} \right|$.*