

**ON THE BICOMPLEX VERSION OF GERSHGORIN CIRCLE
THEOREM AND BOUNDS FOR ZEROS OF BICOMPLEX
POLYNOMIALS**

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(Received: Apr. 09, 2025 Accepted: Jun. 23, 2025 Published: Jun. 30, 2025)

Abstract: This paper develops a bicomplex Gershgorin circle theorem for locating eigenvalues of $n \times n$ bicomplex matrices and applies it to derive classical bounds for zeros of bicomplex monic polynomials.

Keywords and Phrases: Bicomplex number, Gershgorin theorem, eigenvalue, companion matrix, zero, polynomial.

2020 Mathematics Subject Classification: Primary 11R52, 15A18, 15A42
Secondary 15B33, 30C15.

1. Introduction

Determining all eigenvalues of a complex square matrix of higher order is a challenging task. Therefore, it is highly desirable to accurately locate all of these eigenvalues. The precise location of the eigenvalues of a matrix plays a crucial role in determining its properties such as singularity, non-singularity, positive definiteness, or negative definiteness. In 1931, Gershgorin [5] introduced the following remarkable result known as the Gershgorin circle theorem, which provides valuable insights into the eigenvalue distribution of a complex square matrix.

Theorem A. [5] Let $A = (a_{rs})$ be a complex $n \times n$ matrix. Let $R_r(A) = \sum_{s \neq r} |a_{rs}|$, $r =$