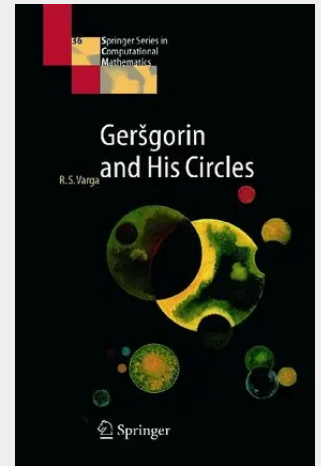


Geršgorin and His Circles

The Geršgorin Circle Theorem, a very well-known result in linear algebra today, stems from the paper of S. Geršgorin in 1931 (which is reproduced in Appendix D) where, given an arbitrary $n \times n$ complex matrix, easy arithmetic operations on the entries of the matrix produce disks, in the complex plane, whose union contains all eigenvalues of the given matrix. The beauty and simplicity of Geršgorin's Theorem has undoubtedly inspired further research in this area, resulting in hundreds of papers in which the name "Geršgorin" appears. The goal of this book is to give a careful and up-to-date treatment of various aspects of this topic. The author first learned of Geršgorin's results from friendly conversations with Olga Taussky-Todd and John Todd, which inspired me to work in this area. Olga was clearly passionate about linear algebra and matrix theory, and her path-finding results in these areas were like a magnet to many, including this author! It is the author's hope that the results, presented here on topics related to Geršgorin's Theorem, will be of interest to many. This book is affectionately dedicated to my mentors, Olga Taussky-Todd and John Todd. There are two main recurring themes which the reader will see in this book. The first recurring theme is that a nonsingularity theorem for matrices gives rise to an equivalent eigenvalue inclusion set in the complex plane for matrices, and conversely. Though common knowledge today, this was not widely recognized until many years after Geršgorin's paper appeared. That these two items, nonsingularity theorems and eigenvalue inclusion sets, go hand-in-hand, will be often seen in this book.

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