

# Chapter 6 Numerical Linear Algebra

## Gerschgorin Circle Theorem

This software is designed to illustrate Gerschgorin Circle Theorem.

Quoted from **【1】** :

Let  $\mathbf{A}$  be an  $n \times n$  matrix and let  $R_i$  denote the circle in the complex plane with center  $a_{ii}$  and radius  $\sum_{\substack{j=1, \\ j \neq i}}^n |a_{ij}|$ ; that is,

$$R_i = \left\{ z \in C \mid |z - a_{ii}| \leq \sum_{\substack{j=1 \\ j \neq i}}^n |a_{ij}| \right\},$$

where  $C$  is used to denote the complex plane. The eigenvalues of  $A$  are contained within  $R = \bigcup_{i=1}^n R_i$ . Moreover, the union of any  $k$  of these circles that do not intersect the remaining  $(n - k)$  must contain precisely  $k$  (counting multiplicities) of the eigenvalues.

References:

- 【1】** R. L. Burden and J. D. Faires, *Numerical Analysis*, PWS, Boston, 1993.