H-Matrix Theory vs. Eigenvalue Localization

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时间：　4 月 4 日 (星期三) 上午 8:30-9:30
地点：计算数学所 (科技综合楼) 311 报告厅

Abstract

The eigenvalue localization problem is very closely related to the H-matrix theory. The most elegant example of this relation is the equivalence between Geršgorin theorem and the theorem about nonsingularity of SDD (strictly diagonally dominant) matrices, which is a starting point for further beautiful results in the book of Richard S. Varga, Geršgorin and His Circles, Springer, 2004. Furthermore, the corresponding Geršgorin-type theorem is equivalent to the statement that each matrix from a particular subclass of H-matrices is nonsingular. Finally, the statement that all eigenvalues of a given matrix belong to so called minimal Geršgorin set is equivalent to the statement that every H-matrix is nonsingular. Since minimal Geršgorin set remained unattainable, a lot of different Geršgorin-type areas for eigenvalues has been developed recently. Along with them, a lot of new subclasses of H-matrices were obtained. A survey of recent results in both areas, as well as their relationships, will be presented in this talk.