复旦大学数学科学学院
数学综合报告会

报告题目： decoupled form of the structure-preserving doubling algorithm with low-rank structures

报告人： ERIC CHU (澳大利亚MONASH大学)

时间： 2020-12-16 星期三 10:00-11:00

地点： 腾讯会议ID：903 901 121

报告摘要：

The structure-preserving doubling algorithm (SDA) is a fairly efficient method for solving problems closely related to Hamiltonian (or Hamiltonian-like) matrices, such as computing the required solutions to algebraic Riccati equations. However, for large-scale problems, the SDA with an $\bigO(n^3)$ computational complexity does not work well. In this talk, we devise a new decoupled form of the SDA and propose a novel doubling method (we name it dSDA) to solve large-scale problems owning low-rank structures. Decoupling the original two to four iteration formulae in the SDA, the proposed dSDA is much more efficient since only one iterate (instead of the original two to four) is computed. For large-scale problems, further efficiency is gained from the low-rank structures for the kernels are of much smaller sizes comparing with those in the original SDA. More importantly, the dSDA can take full advantage of the structures existed in the original data, such as structural sparsity or low-rank update of a diagonal matrix, thus requiring $\bigO(n)$ flops per iteration, enabling it more suitable for large-scale problems. Illustrative numerical results will be presented to show the efficiency of our approach.

非线性数学模型与方法教育部重点实验室
中法应用数学国际联合实验室
上海市现代应用数学重点实验室
复旦大学数学研究所