

数学与系统科学研究院

计算数学所学术报告

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报告题目:

**On tau Matrix-based Approximate
Inverse Preconditioning Technique
for Diagonal-plus-Toeplitz Linear
Systems from Spatial Fractional
Diffusion Equations**

邀请人: 白中治 研究员

报告时间: 2019 年 8 月 12 日 (周一)

晚上 19:00-20:00

报告地点: 数学院南楼七层

702 教室

Abstract:

Due to the special structure of the discretized linear systems from the spatial fractional diffusion equations, the resulting coefficient matrices of discretized systems have a diagonal-plus-Toeplitz structure. Standard circulant preconditioners may not work for such Toeplitz-like linear systems. However, because the resulting Toeplitz matrix is symmetric positive definite (SPD), we can employ the tau matrix to approximate it. By making use of the piecewise interpolation polynomials, we propose a new approximate inverse preconditioner to handle the diagonal-plus-Toeplitz coefficient matrices. The tau matrix-based approximate inverse (TAI) preconditioning technique can be implemented very efficiently by using discrete sine transforms (DST). Theoretically, we have proved that the spectrum of the resulting preconditioned matrices are clustered around one. Thus, Krylov subspace methods with the proposed preconditioners converge very fast. To demonstrate the efficiency of the new preconditioners, numerical experiments are implemented. The numerical results show that with the proper interpolation node numbers, the performance of the tau matrix-based splitting preconditioning technique is better than the other testing preconditioners.

欢迎大家参加！