

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:

**Dominant Hermitian Splitting
Iteration Method for Discrete
Space-Fractional Diffusion
Equations**

邀请人: 白中治 研究员

报告时间: 2019 年 9 月 22 日 (周日)

上午 10:30-11:30

报告地点: 数学院南楼七层

702 教室

Abstract:

The discretizations of the left and the right fractional derivatives based on the shifted finite-difference formulas of the Grunwald-Letnikov type can result in Toeplitz matrices T and T^* . Combining with the generating function of Toeplitz matrix T , we analyse the dominant property of the Hermitian part of T relative to its skew-Hermitian part. Then we construct a dominant Hermitian splitting iteration method for solving the discrete linear system of the considered space-fractional diffusion equations, and design a more practical dominant Hermitian-circulant splitting preconditioner to accelerate the convergence of the Krylov subspace iteration methods. Theoretical analyses demonstrate that all eigenvalues of the corresponding preconditioned matrix are clustered in a complex disk centered at 1 with the radius much less than 1, especially when the order β of the fractional derivative is close to 2. In addition, the numerical results show that the constructed preconditioner can effectively solve the discrete linear systems of one-dimensional and two-dimensional space-fractional diffusion equations.

欢迎大家参加！