数学与系统科学研究院

计算数学所网络学术报告

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报告题目：

Banded Preconditioners for Riesz Space Fractional Diffusion Equations

邀请人：　白中治 研究员

报告时间：**2021 年 9 月 25 日（周六）**

晚上 19:00-20:00

报告工具：腾讯会议 **ID:（252 740 524）**

Abstract:

In this talk, we consider numerical methods for Toeplitz-like linear systems arising from the one- and two-dimensional Riesz space fractional diffusion equations (RSFDEs). We apply the Crank-Nicolson (CN) technique to discretize the temporal derivative and apply certain difference operator to discretize the space fractional derivatives. For the one-dimensional problem, the corresponding coefficient matrix is the sum of an identity matrix and a product of a diagonal matrix and a symmetric Toeplitz matrix. We transform the linear systems to symmetric linear systems and introduce symmetric banded preconditioners. We prove that under mild assumptions, the eigenvalues of the preconditioned matrix are bounded above and below by positive constants. In particular, the lower bound of the eigenvalues is equal to 1 when the banded preconditioner with diagonal compensation is applied. The preconditioned conjugate gradient (PCG) method is applied to solve relevant linear systems. Numerical results are presented to verify the theoretical results about the preconditioned matrices and to illustrate the efficiency of the proposed preconditioners.

欢迎大家参加！