

数学与系统科学研究院
计算数学所网络学术报告

报告人: 张静娜
(扬州大学)

报告题目:
**Numerical Schemes for Time-Space
Fractional Vibration Equations**

邀请人: 唐贻发 研究员

报告时间: 2020年8月7日(周五)
上午 9:00-10:00

报告工具: 腾讯会议 (ID: 497 654 097)

会议链接:

<https://meeting.tencent.com/s/iiATqF57HhII>

Abstract:

In this talk, we introduce two numerical methods for solving time-space fractional vibration equations (FVEs). The first method transforms the considered time-space FVEs into their partial integro-differential forms with classical first order integrals and the Riemann-Liouville derivative. Because the transformation can weaken the smoothness requirement in time when discretizing the partial integro-differential problems. Then we use the Crank-Nicolson technique combined with the midpoint formula, the weighted and shifted Grünwald difference formula to deal with the temporal discretizations and apply the classical central difference formula and fractional central difference formula to approximate the derivatives in spatial direction. Based on the above techniques, we present a numerical scheme and an alternating direction implicit (ADI) scheme for the one-dimensional and two-dimensional time-space fractional vibration equations (FVEs), respectively. The another method discretizes the considered time-space FVEs directly with central difference quotient, Taylor expansion and other approximations. We also construct a linearized difference scheme and an ADI scheme for the one-dimensional and two-dimensional case, respectively. Comparing with the existing linearized schemes, the proposed numerical schemes are simpler and easier for theoretical analysis. All of the above numerical schemes' convergence and unconditional stability are proved rigorously. Finally, four numerical examples are given to support the theoretical results.

欢迎大家参加！