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：

Maximal L^p-regularity of time discretization and finite element methods

邀请人：　洪佳林 研究员

报告时间：2019 年 1 月 13 日（周日）

上午 **10:00-11:00**

报告地点：　　数学院南楼二层

222 教室

Abstract:

We show that for a parabolic problem with maximal L^p-regularity, the time discretization with a linear multistep method or Runge--Kutta method also has maximal ℓ^p-regularity uniformly in the stepsize if the method is A-stable. In particular, the implicit Euler method, the Crank--Nicolson method, the second-order backward difference formula (BDF), and the Radau IIA and Gauss Runge--Kutta methods of all orders preserve maximal regularity.

The proof uses Weis' characterization of maximal L^p-regularity in terms of the R-boundedness of the resolvent operator, a discrete operator-valued Fourier multiplier theorem by Blunck, and generating function techniques that have been familiar in the stability analysis of time discretization methods since the work of Dahlquist.

The $A(\alpha)$-stable higher-order BDF methods have maximal ℓ^p-regularity under an R-boundedness condition in a larger sector.

Extension to fully discrete finite element methods is also given.

As an illustration of the use of maximal regularity in the error analysis of discretized nonlinear parabolic equations, it is shown how error bounds are obtained without using any growth condition on the nonlinearity.

欢迎大家参加！