

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. YU Xijun**

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报告题目:

**Local Discontinuous Galerkin  
Methods for Nonlinear  
Reaction-Diffusion Systems with  
Application of Krylov Implicit  
Integration Factor Methods**

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报告时间: 2018 年 11 月 11 日 (周日)

下午 15:00-16:00

报告地点: 科技综合楼三层

311 报告厅

## **Abstract:**

**Abstract:** In this report, based on two-dimension unstructured triangular meshes, an efficient fully -discrete local discontinuous Galerkin (LDG) method is presented for solving the nonlinear reaction-diffusion systems, which are often used as mathematical models for many biological, physical and chemical sciences. In order to overcome LDG method for the strict time-step restriction ( $\Delta t = O(\Delta x)$ ) of explicit schemes for stability, the implicit integration factor (IIF) method based on Krylov subspace approximation is introduced into the temporal discretization, in which the time-step can be taken as  $\Delta t = O(\Delta x^2)$ . The method can derive the numerical approximations not only for solutions but also for their gradients at the same time comparing other methods for the numerical solutions only. Moreover, the method can compute element by element and avoid solving a global system of nonlinear algebraic equations as the standard implicit schemes do, so that the method can reduce the computational cost greatly. Numerical experiments for the reaction-diffusion equations with exact solutions and the morphogenesis systems from developmental biology are conducted to illustrate the efficient, accurate and advantages of the LDG method coupled with the Krylov IIF time discretization.

**欢迎大家参加！**