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：

A structured grid method for a singularly perturbed reaction-diffusion equation from computational cardiology

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报告地点：　　科技综合楼三层 **311**

计算数学所报告厅

Abstract:

The monodomain equation in computational cardiology, which describes the electrical activity of the heart, is a singularly perturbed reaction-diffusion equation. In this talk, I will introduce a structured grid method for solving the problem. The method applies the technique of operator splitting to integrate the linear diffusion part separately from the nonlinear reaction part in each timestep during time integration. The method adapts Cartesian grids for space discretization of the split diffusion equation on the irregular/complex problem domain to avoid the generation of body-fitted unstructured grids. The semi-discretization of the diffusion equation on a Cartesian grid as well as the split reaction equation are (severely) stiff problems. We integrate both of them with a one-step L-stable second-order accurate time integration method, called the composite backward differentiation formula. The space part of the discrete diffusion equation is computed with the recently developed kernel-free boundary integral method. At the end of this talk, I will present numerical results for the monodomain equation in both two and three space dimensions. To the best of my knowledge, this is the first Cartesian/structured grid based method for singularly perturbed reaction-diffusion equations on complex domains (In the literature, there are structured grid based methods for parabolic PDEs but not for singularly perturbed reaction-diffusion equations).

欢迎大家参加！