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：

CFD and Numerical Heat Transfer with Spectral Element Methods

邀请人：　袁礼 研究员

报告时间：2017 年 8 月 9 日（周三）

上午 10:00-11:00

报告地点：　数学院南楼七层

702 教室

Abstract:

Spectral element methods (SEM) are superior to general finite element methods in achieving high-order accuracy with fewer elements. Owing to modified orthogonal polynomials as basis functions in SEM, the discretization errors could be reduced exponentially to machine zero so that SEM could achieve the spectral convergence. Depending on the specific choices of expansion and test functions, SEM could be either Nodal or Modal method. The spectral convergence property is especially desirable in achieving extra high (above 15th order) resolution for certain applications, e.g., resolving an electrical double layer in eletrokinetic flow or capturing a sharp velocity gradient in a thin boundary layer.

Applications of SEM are demonstrated for numerical solutions to fluid flow and convective heat transfer problems. Particulate flow is one form of multiphase flow occurring widely in engineering and nature. Challenges in modeling particulate flow phenomena include tracking moving internal boundaries which are part of the solution and quantifying large amount of interactions among particles and the fluid. An economical computational physics model was developed for particulate flows with many moving particles on a fixed Eulerian mesh. The applications to thermal convection are illustrated in a few examples and validated with lab experimental data.

欢迎大家参加！