数学与系统科学研究院

计算数学所学术报告

报告人：**Prof. Peter Minev**

（ ***University of Alberta*** ）

报告题目：

RECENT SPLITTING SCHEMES FOR THE INCOMPRESSIBLE NAVIER–STOKES EQUATIONS

邀请人：　洪佳林 研究员

报告时间：**2018** 年 **6** 月 **2** 日（周六）

上午 **9:30-10:30**

报告地点：　数学院南楼二层

222 教室

Abstract:

The presentation will be focussed on two classes of recently developed splitting schemes for the Navier-Stokes equations.

The first class is based on the classical artificial compressibility (AC) method. The original method proposed by J. Shen in 1995 reduces the solution of the incompressible Navier-Stokes equations to a set of two or three parabolic problems in 2D and 3D correspondingly. Unfortunately, its accuracy is limited to first order in time and can be extended further only if the resulting scheme involves an elliptic problem for the velocity vector. Recently, together with J.L. Guermond (Texas A&M University) we proposed a scheme that extends the AC method to any order in time using a bootstrapping approach to the incompressibility constraint that essentially requires to solve only a set of parabolic equations for the velocity. The conditioning of the corresponding linear systems is therefore much better than the one resulting from an elliptic problem for the velocity.

The second class of methods is based on a novel approach to the Navier-Stokes equations that reformulates them in terms of stress variables. It was developed in a recent paper together with P. Vabishchevich (Russian Academy of Sciences). The main advantage of such an approach becomes clear when it is applied to fluid-structure interaction problems since in such case the problems for the fluid and the structure, both written in terms of stress variables, become very similar. Although at first glance the resulting tensorial problem is more difficult, if it is combined with a proper splitting, it yields locally one dimensional schemes with attractive properties, that are very competitive to the the most widely used schemes for the formulation in primitive variables. Several schemes for discretization of this formulation will be presented together with their stability analysis.

Finally, numerical results for a problem with a manufactured solution will be presented.

欢迎大家参加！