数学与系统科学研究院

计算数学所博士后定期学术报告

报告人： **Dr. JiPing Xin**

（*Pdoc*，*ICMSEC* ）

报告题目：

Parallel Fast Boundary Element Software

报告时间：**2012 年 9 月 26 日**（周三）

下午 **16：00～17：00**

报告地点： 科技综合楼三层 **311**

计算数学所报告厅

Abstract:

There are many famous finite element softwares used in the research and the industry. Compared with finite element softwares, boundary element softwares are very few. Boundary element methods are used to solve boundary integral equations and they have a very good advantage to reduce volume computations to surface computations, especially for exterior problems in scattering and transimission. For our knowledge, we didn't find a mature parallel fast boundary element software. In this year we develop a new BEM software — LBEM — and we introduce the main idea and framework in this talk.

Our work for LBEM is based on the study of FEM softwares. If we don't consider the fast algorithms for BEMs, the algorithms for Galerkin-BEMs are similar with FEMs. The core of FEM softwares is the data structures of meshes and linear algebra. This is the same for BEM softwares. Our data structure of meshes on boundaries follows the concept of "Point Objects" from C. Wieners (KIT) used in M++ — a parallel multigrid finite element software — and an abstract definition of meshes from P. Bastian (Heidelberg) used in DUNE — http://www.dune-project.org/ —. Before DUNE, P. Bastian with his colleagues also developed the other parallel adaptive multigrid FEM software based on unstructured meshes — UG http://atlas.gcsc.uni-frankfurt.de/ ug/ —. Some ideas of M++ and DUNE are from the experiences of UG. So LBEM also inherits some properties from UG. After the definition of meshes, the next step is to define basic linear algebra. In this step for BEMs we need to consider fast algorithms. In LBEM we use hierarchial matrices (ACA+) from the group of W. Hackbusch (MPI). Compared with large and sparse matrices used in FEM softwares, we define hierarchical matrices in BEM softwares. All these steps in the design of softwares from meshes to geometrically based data are very standard for FEMs and BEMs.

欢迎大家参加!