数学与系统科学研究院

计算数学所学术报告

报告人：　　刘娜　博士

（ 厦门大学电子系 ）

报告题目：

The Efficient Mixed FEM with Mass-lumping and Impedance Transmission Boundary Condition for Computing Optical Waveguide Modes

邀请人：　　唐贻发 研究员

报告时间：**2016** 年 **12** 月 **16** 日（周五）

晚上 **20:00-21:00**

报告地点：　　数学院南楼七层

702 教室

Abstract:

The microwave and optical waveguide structures, such as dielectric waveguides, photonic crystal fibers, plasmonic, and hybrid plasmonic waveguides, gain their extensive applications in communication, signal processing, integrated optics, and biophotonics. Advanced numerical methods with high efficiency and accuracy are required to determine propagation modes and to optimize geometrical and material parameters. An efficient mixed finite element method (FEM) with mass-lumping technique and impedance transmission boundary condition (ITBC) are respectively proposed for computing the optical waveguide modes with anisotropic and lossy media. By incorporating the Gauss' law into the vectorial wave equation, the variational formulation is completely free of spurious modes. Furthermore, to avoid the very fine spatial discretization of thin lossy sheet, ITBC have been proposed for the new mixed FEM formulations. Numerical examples can verify that the mixed FEM with mass-lumping and the mixed FEM ITBC techniques are free of any spurious eigenmodes and have high efficiency. The new contributions of this work include: (a) the mixed FEM with mass lumping is proposed for the first time to remove all spurious modes. (b) The diagonal mass matrix and the smaller eigenvalue equation speed up the computation. (c) Both lossy and anisotropic media are made possible in the proposed method for optical waveguide problems. (d) The ITBC is first implemented in the new FEM formulation. Finally, numerical results clearly demonstrate that the proposed mixed FEM with mass lumping and ITBC technique are efficient alternative methods to determine the optical waveguide modes.

欢迎大家参加！