**岩土与地下工程系 学术交流报告**

**题 目**：Theoretical Formulation and Numerical Implementation of Multiscale Fracture Propagation for Brittle Solids （脆性体多尺度断裂的理论推导与数值实现）

**报 告 人**：金文城 Ph.D. Candidate

**时 间**：5月19日（星期五）上午10：30

**地 点**：水电学院 A-223

**个人简介**：2007.9-2011.7就读于四川大学工程力学系，工学学士；2011.9-2014.7就读于四川大学工程力学系，工学硕士；2014.8-2016.8 就读于佐治亚理工土木工程系，科学硕士；2014.8-今，就读于佐治亚理工土木工程系。

**研究方向**：微观力学损伤本构，宏观现象损伤本构，跨尺度断裂，多屈服面的回映算法，基于微分或积分的非局部调整，宏细观裂隙发展与渗流场耦合。在国际著名刊物，如《International Journal of Solids and Structure》，《International Journal of Damage Mechanics》，《International Journal for Numerical and Analytical Methods in Geomechanics 》，《International Journal of Rock Mechanics and Mining Science》等发表SCI论文10篇。

**报告摘要**：

Macroscale fracture propagation in brittle solids is the result of inception, growth and coalescence of micro cracks at grain scale. Assume creating macro fracture surfaces is the only energy dissipation mechanism, the classical fracture mechanics based on stress intensity factor or energy release rate may fail to capture fracture path. In addition, the induced anisotropic behavior of bounding matrix is neglected as well. In this talk, we first present the continuum approach using damage model. Macro scale phenomenological behavior, such as unilateral effect and brittle-ductile transition are accounted through constitutive relation, and fracture propagation is simulated as stiffness reduction. Secondly, we couple a cohesive zone model to explicitly simulate macro fracture and a continuum damage model to account for micro crack evolution within process zone. Systematical calibration is utilized to dissipate energy at crossing scale correctly. Third, discrete micromechanics models are proposed to model micro crack initiation and propagation before coalescence, and its internal state variable, crack density, is employed to construct macro fracture propagation criteria. Within the three topics, numerical implementation, such as return mapping method at Gauss point, nonlocal regularization for mesh dependency, arc length control at the global iteration will also be discussed.

**欢 迎 广 大 师 生 光 临**