# 数学与系统科学研究院

# 计算数学所学术报告

**报告人：Prof. Timon Rabczuk**

*（ 魏玛-包豪斯大学 结构力学研究所）*

**报告题目：**

**Multiscale Modeling of Fracture**

**邀请人：** 崔俊芝 院士

**报告时间：2017 年 8 月 16 日（周三）**

**下午 15:30-16:30**

**报告地点：** 数学院南楼六层

**602 报告厅**

# Abstract:

**Efficient computational methods to model non-linear material failure over multiple length scales will be presented. The first part of the presentation will focus on partition of unity methods for fracture on the macro-scale. In this context, the cracking particles method (CPM), the extended element-free Galerkin (XEFG) method and the phantom node method for cracks and shear bands in continua and structures will be explained. The key idea of those methods is to introduce additional degrees of freedom into the variational formulation in order to account for the kinematics of cracks and shear bands. The second part of the presentation deals with multi-scale methods for fracture. Due to the ill-posedness of the underlying (initial) boundary value problem and the associated lack of scale separation, a concurrent multiscale approach will be discussed in order to couple a fine-scale model with a coarse-scale model. The coarse-scale model is based on continuum mechanics while an atomistic or continuum approach is employed at the fine-scale. Two different approaches based on the extension of the Arlequin-method and Bridging-Scale method will be presented. A simple and efficient algorithm to upscale cracks from an atomistic model to a continuum model will be proposed as well.**

# 报告人简介：

**Timon Rabczuk** 教授研究方向有计算力学、多尺度分析、先进材料设计，是无网格颗粒断裂法的创始人，在计算固体力学、计算物理本构模型、流体-固体相互作用、数值方法等研究方向做出了基础性和原创性的贡献。**Rabczuk** 教授 **2002** 年在德国卡斯鲁厄大学获博士学位，**2002-06** 年在西北大学 **Belytschko** 教授课题组从事博士后研究，**2007** 年获新西兰坎特伯雷大学副教授，**2009** 年获德国魏玛大学计算力学终身教授职位。他被 **ISI** 同时列为“**Engineering**”和“**Computer Science**”两个领域的“高引用学者”**(Highly Cited Researcher)**，是为数不多的在两个领域同时列入“高引用学者”的科学家，其学术成果得到了国际同行的广泛认可，三维断裂程序被韩国高速公路公司采购并作为研发使用。**2013** 年他入选洪堡基金会的费吕南学者计划，也是欧盟多个大型项目的负责人，包括地平线 **2020** 和 **FP7** 最为权威的人才巩固团队计划 **ERC Consolidator**。

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