学 术 报 告

题　目：Periodic Metamaterial-based Seismic Base Isolators for Engineering Structures

报告人：Prof. Y.L. MO

美国休斯敦大学

时　间：2019 年 5 月 21 日（星期二）下午 2:30

地　点：西六楼 312 室

邀请人：朱宏平 教授

【报告摘要】 This lecture will present an attempt to overcome the disadvantages existing in current seismic isolation systems by developing innovative periodic metamaterial-based seismic base isolators. These periodic metamaterial-based seismic base isolators, in effect, use the foundation of the structure as the base isolation system. The foundation is made of a new material, called periodic metamaterial, which can block, or reflect, the damaging seismic motion being transmitted to the structure. Both the analytical and experimental studies have performed to demonstrate the feasibility and effectiveness of the proposed periodic metamaterial-based seismic base isolators. Guided by solid state physics, the periodic metamaterial-based seismic base isolators can be made by the periodic metamaterial to exhibit special characteristics that are useful in resisting the loads imposed on structures from earthquakes. Possessing distinct frequency band gaps, this periodic metamaterial will block, or reflect, the incoming seismic motion with the frequencies falling between these gaps. The frequency band gaps in the x, y, and z directions can be controlled by their design and manufacturing, exactly what is needed for periodic metamaterial-based seismic base isolators. One can properly design the frequency band gaps to match the fundamental frequency of the structure, so that its dynamic response will not be amplified; alternatively, one can design the frequency band gaps to match the strong energy frequency components of the design earthquake. Periodic metamaterial-based seismic base isolators have been proposed for engineering structures to mitigate the potential damage caused by the earthquake and to increase the safety margin of the engineering structures. Also, periodic metamaterial-based seismic base isolators can enhance the design of standard engineering structures, which can be licensed and built at lower costs.

【报告人简介】Y.L. Mo 教授，美国休斯敦大学土木与环境工程学院教授，John and Rebecca Moores 荣誉教授，清华大学首席教授。曾任著名结构实验室 Thomas T.C. Hsu Structural Research Laboratory 主任（2013-2016）。美国土木工程学会会士（ASCE Fellow），美国混凝土学会会士（ASCE Fellow），台湾地震工程研究中心顾问(NCREE)，台湾基础研究中心主任，汉诺威大学亚历山大•冯•洪堡（Alexander von Humboldt Visiting Professor,）客座教授，台湾成功大学大学教授及结构工程实验室主任，斯坦福大学高级访问学者，韩国能源工程公司客座工程师。Mo 教授为美国注册工程师（Professional Engineer, P.E.），1984-1991 年在 Sargent and Lundy Engineers 公司从事 8 年的结构工程设计工作。

Y.L. Mo 教授工程经验丰富、研究领域广泛，荣获数十项美国国家基金委、美国能源部和交通部的大型科研项目的资助。研究工作主要包括混凝土结构的有限元数值模拟及大尺度结构实验方法，提出了著名的 CSMM 模型。在智能材料与结构的研究领域，提出了基于碳纳米纤维的混凝土应力检测方法及基于周期性材料的建筑结构减隔震方法。Y.L. Mo 教授目前已经发表 209 篇期刊论文及 162 篇会议论文，其中特邀报告 77 篇，著有 5 篇学术专著及 8 项美国专利。谷歌学术论文引用量、H 指数及 I-10 指数分别为 5116, 38 和 95（google scholar citation=5116, h-index=38, i10-index=95）。Y.L. Mo 教授长期以来一直和国内的高校和科研院所保持密切的合作关系，已培养博士后 6 名，博士 25 名，硕士 46 名和 31 位访问学者。