



CIRCLE  
Distinguished Lecture Series

Dr. Jin-Guang Teng

## Structural engineering innovations with emerging materials for a carbon-neutral future

**ABSTRACT:** While steel and concrete are still the main structural materials today, several promising new options have emerged as alternative or supplemental materials for structural use. These emerging materials include fiber-reinforced polymer composites, fiber-reinforced cementitious composites, fabric-reinforced concrete, seawater sea-sand concrete, ultrahigh-performance concrete, ultrahigh-performance steel, and various types of green materials. Although these materials hold great potential for stronger, lighter and more durable structures, their adoption in structural engineering has been slow. In this presentation, I will first examine the merits and potential of the major categories of emerging structural materials, the obstacles for their wider/faster adoption, and the way forward for overcoming these obstacles. I will then focus on the combined use of these materials among themselves, or with traditional materials, to create new types of hybrid structures where two or more materials are combined in an optimal manner to maximize performance while minimizing the consumption of natural resources and carbon emissions. A number of examples of such new-material hybrid structural forms will be discussed to illustrate their advantages. The presentation will conclude with observations on future trends in the structural use of emerging materials within the perspective of a carbon-neutral world, suggesting that these emerging materials will play a major role in achieving a low-carbon future for structural engineering.

**Bio:** Professor Jin-Guang Teng, President and Chair Professor of Structural Engineering of The Hong Kong Polytechnic University (PolyU), is a Member of the Chinese Academy of Sciences, a Corresponding Fellow of the Royal Society of Edinburgh and a Fellow of the Hong Kong Academy of Engineering Sciences. He received his BEng Degree from Zhejiang University in 1983 and his PhD degree from the University of Sydney in 1990. His main research areas include the structural use of fiber-reinforced polymer (FRP) composites in construction and steel structures. Many of his research findings have been adopted by relevant design codes/guidelines in China, Australia, Europe, the United Kingdom and the United States. The research awards he has received include the State Natural Science Award of China (Second Class) and the inaugural IIFC Medal from the International Institute for FRP in Construction (IIFC).

**CIRCLE:** The Center for Infrastructure Resilience in Cities as Livable Environments is one of three research themes supported by the joint Dynamic Research Enterprise for Multidisciplinary Engineering Sciences (DREMES), established between the University of Illinois at Urbana-Champaign (UIUC) and Zhejiang University (ZJU). The CIRCLE Distinguished Lecture Series is intended to provide opportunities for faculty and students to meet and interact with internationally renowned experts in the field.

To register send an email to [circle@intl.zju.edu.cn](mailto:circle@intl.zju.edu.cn) or scan the QR code. Registration is free.

20 APR 2022 on  zoom | at 8AM CDT - 9PM Beijing Time

GET YOUR SEAT  
SCAN TO REGISTER!  
[circle.cee.illinois.edu](http://circle.cee.illinois.edu)







滕锦光院士

CIRCLE  
杰出讲座系列

## 基于新型材料的结构工程创新及其对碳中和发展的贡献

**摘要：** 尽管钢材和混凝土仍是当今最主要的结构材料，但有几种新型结构材料已经展现出良好的应用前景，它们有机会在未来成为传统材料的替代或补充选择。这些新型材料包括纤维增强树脂基复合材料，纤维增强水泥基复合材料，织物增强混凝土，海水海砂混凝土，超高性能凝土，超高性能钢材，以及各类绿色材料。虽然这些材料在建造更坚固、更轻巧、更耐久的结构方面具有巨大的潜力，但到目前为止它们在结构工程中的应用进展缓慢。在此报告中，我将首先介绍几种主要新型结构材料的优点和潜力，剖析其在工程应用中遇到的阻碍，并探讨克服这些阻碍的途径。然后，我将讨论如何通过不同新型材料的组合使用，以及新型材料和传统材料的组合使用，将两种或多种材料优化组合在同一个结构中，以达致最优结构性能、最少自然资源消耗和最低碳排放量的效果。本次报告将以几个新型组合结构形式为例，阐述该类结构的优点。最后，我将探讨在碳中和发展的视角下，新型材料在结构工程中的应用前景，从而说明这些新型材料在碳中和发展中可扮演的重要角色。

**简介：** 滕锦光教授，香港理工大学校长，结构工程讲座教授，中国科学院院士，英国爱丁堡皇家学会通讯院士，香港工程科学院院士。1983年获浙江大学工学学士学位，1990年获悉尼大学博士学位。主要从事土木工程复合材料结构和钢结构领域的研究，大量研究成果被我国、美国、欧洲、英国、澳大利亚的相关设计标准或指南所采纳。曾获国家自然科学奖二等奖、国际土木工程复合材料学会首枚学会奖章等奖励。

**CIRCLE：** 宜居城市基础设施韧性中心是伊利诺伊大学厄巴纳-香槟分校 (UIUC) 格兰杰工程学院和浙江大学 (ZJU) 建立的三个联合研究中心之一。CIRCLE 杰出讲座系列旨在为教师和学生提供与该领域国际知名专家会面和互动的机会。

发送邮件至 [circle@intl.zju.edu.cn](mailto:circle@intl.zju.edu.cn) 或扫描二维码报名，免费注册。

2022年04月20日



zoom

北京时间：晚上9点

扫描二维码立刻报名  
[circle.cee.illinois.edu](http://circle.cee.illinois.edu)





# Do you want to watch our previous CIRCLE Distinguished Lectures?

## Scan the QR code or click on the link!



CIRCLE  
Distinguished Lecture Series

Dr. Jennifer Schooling

### Flourishing Systems:

Transforming the future of our built environment through smarter information



CIRCLE  
Distinguished Lecture Series

Dr. John E. Taylor

### Smart City Digital Twins:

Toward More Sustainable, Resilient, and Livable Cities



CIRCLE  
Distinguished Lecture Series

Dr. Carlo Ratti

### Senseable Cities



CIRCLE  
Distinguished Lecture Series

Dr. Lucio Soibelman

### The Architectural, Engineering, and Construction Industry and the Fourth Industrial Revolution



CIRCLE  
Distinguished Lecture Series

Dr. Washington Y. Ochieng

### Planning, Design, Modelling, Simulation and Visualisation Platform for Sustainable Cities



CIRCLE  
Distinguished Lecture Series

Dr. Lilia A. Abron

### Convergence of Engineering, Science, and Sociology for Equitable Solutions to Environmental Problems



CIRCLE  
Distinguished Lecture Series

Dr. Hui Li

### A Roadmap for Physical Artificial Intelligence in Civil Engineering