香港科技大學
THE HONG KONG UNIVERSITY OF SCIENCE AND TECHNOLOGY

土木及環境工程學系
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

SEMINAR

POST-PEAK DEFORMATION BEHAVIORS OF BRITTLE HARD ROCKS

Speaker

Prof. Ming CAI

Laurentian University

Abstract

This talk discusses one of the challenges in rock mechanics and rock engineering – how to obtain accurate post-peak stress–strain curves of brittle hard rocks. It first reviews some efforts taken by previous researchers in developing rock mechanics test machines and techniques that address this challenge. Then, unique features of a newly developed super stiff rock mechanics test machine called Stiffman are introduced. Complete stress–strain curves of several brittle rocks are obtained using Stiffman. Compared with conventional test machines, Stiffman does not cause explosive failures of rock specimens, and the obtained stress–strain curves all show Class I post-peak deformation behaviors under axial-strain-controlled loading. The machine also allows rock specimens to reach the residual deformation stages and thus a proper assessment of the peak, plastic-strain-dependent post-peak, and residual strengths of brittle hard rocks. The controversy of Class I and Class II rocks is discussed. The influence of loading environment system stiffness on the post-peak stress–strain curves of brittle hard rocks is also presented.

Biography

Dr. Cai is a Full Professor in Laurentian University's School of Engineering and Computer Science and holds a position as Geomechanics Research Chair. Dr. Cai holds Bachelor's and Master's degrees from Tsinghua University in China and a PhD degree from the University of Tokyo in Japan. Prior to joining Laurentian University, he worked for Mansour Group Inc., MIRARCO, Tokyo Electric Power Services Ltd., and Tsinghua University and had over 30 years of research, education, and industry experience. He has a wide variety of interests in rock mechanics and rock engineering and made exceptional technical and scientific contributions to many topics including constitutive modeling of rock masses, rock mass characterization, rock support in burst-prone grounds, interpretation of AE and microseismic monitoring data, rock failure process simulation, and rock mechanics testing. Dr. Cai is the author/co-author of more than 250 scientific publications. He was awarded the Canadian Geotechnical Society's John A. Franklin Award in 2017 for his exceptional contribution to rock mechanics and rock engineering. Currently, he is the Associate Editor of Deep Resources Engineering and an editorial member of seven international journals in the field of his research interests.

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Enquiry:

Ms. Rebecca Yau
cerebeca@ust.hk