Critical Phenomena in The Yielding Transition of Amorphous Solids

by

Dr. Jie LIN (林杰博士)

Harvard John A. Paulson School of Engineering and Applied Sciences
Harvard University, USA

Date: September 25, 2019 (Wednesday)
Time: 11:15 a.m. - 12:15 p.m.
Place: Rm. G25, Science Centre North Block, CUHK

ALL INTERESTED ARE WELCOME
****

Abstract

Failure and flow of amorphous materials are central to various phenomena including earthquakes and landslides. There is accumulating evidence that the yielding transition between a flowing and an arrested phase is a critical phenomenon, but the associated exponents and their scaling relations are not well understood. In this talk, I will first introduce the pseudo-gap in the distribution of local stabilities of amorphous solids. I will explain how the pseudo-gap exponent enters the scaling description of the yielding transition in which I relate it to the Herschel–Bulkley exponent of the flow curve and the power-law exponents in the distribution of plastic avalanches. I will further consider the failure of amorphous solids as one increases the external shear stress slowly. I will argue that the entire solid phase below the yield stress is critical with system-spanning avalanches due to the finite pseudo-gap exponent. Finally, if time permits, I will introduce the recently solved mean-field models which capture the broad distribution of mechanical noise generated by plasticity, whose behavior is related to biased Levy flights near an absorbing boundary.

Enquiries: 3943 6303