Fracture and Friction across Materials and Scales

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Abstract

The goal of this mini-colloquium is to gather researchers from different communities – fracture mechanics, plasticity, tribology, adhesive contact, and geophysics – interested in unravelling the mechanisms governing the nucleation and propagation of fractures within materials and along interfaces. In particular, we are interested in cases where microscale mechanisms play a crucial role in governing the emergent macroscopic behaviour, intimately linking multiple time- and length-scales together. Examples of interest include failure processes taking place in seismic faults, granular media, heterogeneous materials, and beyond. This mini-colloquium solicits contributions in all fields related to multiscale physics, computational modelling, and experimental investigations relevant to fracture, fragmentation processes, friction. Possible topics may include but are not limited to: (a) experimental observation of friction [1-5] and fracture [6-7] nucleation and propagation at different scales, (b) theoretical and computational analysis of nucleation and propagation of tensional or frictional ruptures [8-9].

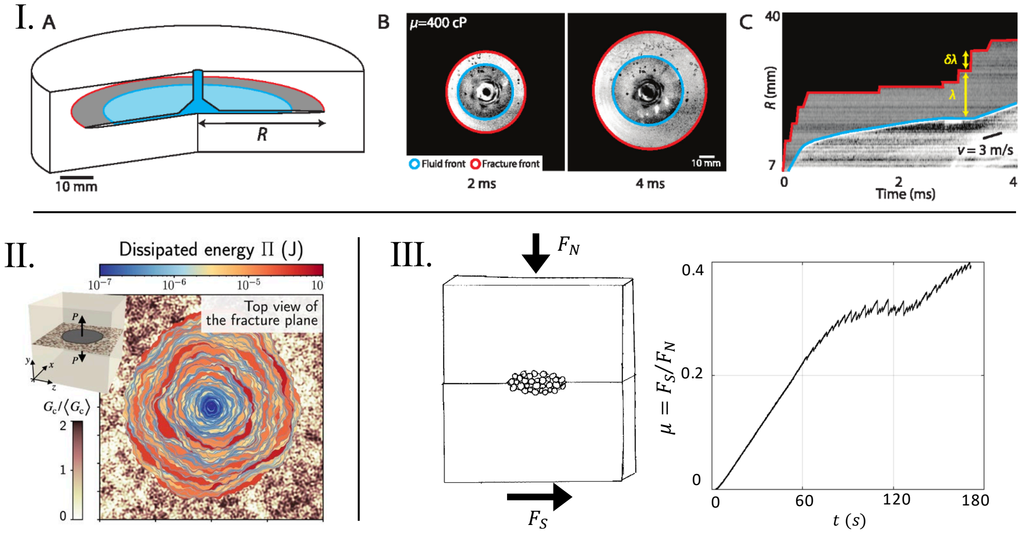

*Figure: **I. (A)** Experimental setup showing the penny-shaped growing fracture with the fluid (blue) lagging the fracture front (red). **(B)** The fracture and fluid fronts 2 ms and 4 ms after the crack initiation. **(C)** Space-time plot of fluid front (blue line) and fracture front (red line). The fracture follows stick-break motion. Adapted from [6]. **II.** Energy dissipation during intermittent propagation of a tensile crack in a heterogeneous brittle medium. **III.** Frictional curve of a heterogeneous interface. A granular patch affects the macroscopic response of the system, adapted from [1].*

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