EML WEBINAR

ZOOM DISCUSSION: 271 079 684
YOUTUBE LIVE: HTTPS://TER.PS/EMLYOUTUBELV
WEDNESDAY, 7 OCTOBER 2020
10 AM BOSTON, 3 PM LONDON, 10 PM BEIJING

KAUSHIK BHATTACHARYA

CALIFORNIA INSTITUTE OF TECHNOLOGY

LIQUID CRYSTAL ELASTOMERS

New materials and new applications of materials enable the drive to create the world that never was. This talk focusses on the emerging class of responsive materials that promise new possibilities in soft robotics, and in particular the interesting questions in mechanics that their development and application raise. Of particular interest are instabilities in both the material and structure, and the exploitation of these instabilities for applications. We use liquid crystal elastomers as a case study. These are rubbery solids (elastomers) with liquid crystal mesogens incorporated into their polymer chains. They display an isotropic to nematic phase transformation accompanied by a large spontaneous deformation. This in turn leads to rich variety of phenomena including ultra-soft behavior, stripe domains, shape-morphing etc. Further, when made as slender structures, the structural instability of slender structures and the material instabilities of liquid crystal elastomers combine and compete in interesting ways. Finally, these materials can be used to couple mechanical response to other stimuli like light or magnetic field. The talk will describe various questions of mechanics that arise in the study of these materials and their impact on application.

Kaushik Bhattacharya is Howell N. Tyson, Sr., Professor of Mechanics and Professor of Materials Science as well as the Vice-Provost at the California Institute of Technology. He received his B.Tech degree from the Indian Institute of Technology, Madras, India in 1986, his Ph.D from the University of Minnesota in 1991 and his post-doctoral training at the Courant Institute for Mathematical Sciences during 1991-1993. He joined Caltech in 1993. His research concerns the mechanical behavior of solids, and specifically uses theory to guide the development of new materials. His honors include the von Kármán Medal of the Society of Industrial and Applied Mathematics (2020), Distinguished Alumni Award of the Indian Institute of Technology Madras (2019), Outstanding Achievements Award from the University of Minnesota (2018), the Warner T. Koiter Medal of the American Society of Mechanical Engineering (2015) and Graduate Student Council Teaching and Mentoring Award at Caltech (2013). He served as editor of the Journal of the Mechanics and Physics of Solids from 2004-2015.

Discussion Leader: **Prof. Shengqiang Cai**, UCSD

Extreme Mechanics Letters (EML) seeks to publish research of immediacy, depth, and originality.