Thermo-Mechanical Modeling of Microstructural Defects: From Lattice Mismatches to Cracks in Crystalline Systems and Thin Films

.....

Overview

Defects in materials play a crucial role in the thermo-mechanical behavior of systems. For example, a real crystal with dislocations, which is one type of crystal defect, is thousand times weaker than an ideal crystal without dislocations. The prediction of materials behavior can accurately be obtained by incorporating these defects into physical and computational models. This course will introduce the participants to a myriad of defects in metals, alloys, nanocomposites, and thin films at scales ranging from the nano to the macro. These defects will range from the atomistic defects, such as vacancies to the mesoscale defects, such as cracks and voids. The focus will be on incorporating physically based theories and approaches, and how they can be integrated with numerical modeling and experimental mechanics.

The primary objectives of the course are

i) Introduce participants to the fundamentals of non-linear modeling of defects in metals, alloys, nanocomposites, and thin films.
ii) Provide an understanding of why modeling is necessary for systems subjected to extreme loading conditions due to changes in strains, strain-rates, and temperatures and how this is related to defect evolution.
iii) Expose participants to state of the art modeling of defects and how this can be utilized for both the academic and professional worlds.

This course is intended for graduate as well as advanced undergraduate students, post-doctoral research associates, government researchers, academic professionals, and practicing engineers. Course participants will learn these topics through lectures and assignments.

Modules	**Duration: December 18 – December 22** **Venue: Centre for Education Technology, IIT Guwahati** **Number of participants for the course will be limited to seventy.**
You Should Attend If…	▪ you are a mechanical engineer, materials engineer or materials scientist working in any company or research laboratory and interested in materials microstructure and its modeling. ▪ you are a student or faculty from academic institution interested in learning what are the effects of materials microstructure on thermo-mechanical behavior of materials.
Fees	The participation fees for taking the course is as follows: **Participant from abroad : US $500** **Participant from Industry/ Research Organizations : INR 10000** **Participant from Academic Institutions (Faculty) : INR 3000** **Students : INR 1000** (For students, it is just caution money that will be refunded after the course completion) The above fee include all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hour free internet facility. The participants need to make additional payment for on-campus accommodation and food.

The Faculty

Prof. M. A. Zikry is the Zan Prevost Smith Distinguished Professor at North Carolina State University in the Department of Mechanical and Aerospace Engineering.

He has received the Jefferson Science Fellowship (Advisor to the Secretary of State, U.S. State Department), Senior Research Fulbright Award, the RJ Reynolds Award, the ALCOA Distinguished Research Award, NCSU Research Excellence Award, and the Ralph Teetor Research Award from the Society of Automotive Engineering. He has also received the Alumni Award for Impact from the University of California, San Diego, and the Distinguished Alumni Award from the University of Kansas.

He has been awarded a Professeur, Premiere Classe, Strasbourg University. He is a Fellow of the American Association for the Advancement of Science (AAAS), the Society of Engineering Science (SES) and the American Society of Mechanical Engineering (ASME). He was the Chair of the Executive Committee of ASME's Material's Division. He has been a senior research advisor to the Army Research Office and a consultant to numerous industries.

He is the Editor-in-Chief of ASME Journal of Engineering Materials and Technology and the Regional Editor of Mechanics of Materials.

His research interests include computational modeling of hierarchical models from nano to the macro scales, prediction of material and structural response based on physically based material models, failure models for heterogeneous ductile and brittle systems, microstructural effects due to grain-boundaries, cell walls, sub-grains and grain morphology dynamic failure, experimental solid mechanics involving AFM, TEM, and SEM analyses of nano and micro failure surfaces

Dr. Prasenjit Khanikar is an Assistant Professor of Mechanical Engineering Department at the Indian Institute of Technology Guwahati. His research interests include modeling and experimental characterization of materials microstructure, crystalline plasticity and high strain loading.

Course Co-ordinator

Dr. Prasenjit Khanikar
Phone: (91)361-258-3438, (91)76360-59802
E-mail: pkhanikar@iitg.ernet.in

.....

http://www.iitg.ac.in/pkhanikar/GIAN/gian2017.html