MHRD Scheme on Global Initiative on Academic Network (GIAN)

MICROMECHANICS OF FRACTURE

January 21-25, 2019, IIT Delhi

Overview

Fracture and micromechanics are powerful tools used to understand and predict the behaviour of modern materials and structures. Fracture Mechanics describes the behaviour of cracked structures including failure on the macroscale and on the microscale. Micromechanics, on the other hand, investigates the impact of the inhomogeneous structure of the material, including its defects, on the macroscopic behaviour. Therefore, both fields are strongly linked. They are important to design macroscopic structures, to design new materials with specific properties, to avoid failure and to understand and explain the behaviour of materials. The course aims to provide the most important principles, concepts, models and methods of Fracture and micromechanics. This includes brittle and ductile fracture, the mechanics of defects and driving forces, the micro to macro transition and homogenization methods. Touched are also methods like the phase-field method.

The course familiarizes the participant with the most important concepts, models and methods of Fracture and Micromechanics. The participant's knowledge on the influence parameters which determine fracture and defect growth or movement will be increased. This applies also to the inhomogeneous character of the material including its defects. Furthermore, the appreciation for the relationship between the material structure on the microscale and the properties on the macroscale will be developed. The participant will gain knowledge on important methods used in material or structural design.

Topics covered

- Fracture Mechanics: Brief summary of the basics of linear elasticity
- Introduction to Finite element analysis of crack in solids
- Fracture Mechanics, Configurational Forces
- Micromechanics, Defect Mechanics
- Micromechanics, Homogenization, Phase-field method

Participant

You are welcome to participate in this course if you are

A Civil/Mechanical/Offshore engineer/Naval Architect or research scientist interested in designing

An Engineer and/or R&D professional from industries and/or R&D professional from government R&D labs interested to learn the development of the fracture and micromechanics of materials

A student (M.Tech./M.Sc./Ph.D. or senior level B.Tech.) or faculty from academic institutions interested in learning fracture mechanics

Registration procedure

Registration at GIAN portal:

Register in the GIAN portal http://www.gian.iitkgp.ac.in/GREGN/index., by paying Rs. 500/- online. Registration to this portal is done only once. Please note that Course fee is separate.

Course Registration: Login to the GIAN portal with the registered User ID and Password. Choose for the Course registration option. Select the course titled "Micromechanics of Fracture" from the list and click the "Save" option. Confirm your registration by clicking the suitable option.

Last date for the registration of this course is 1st November 2018.

Course Shortlisting: Candidates will be intimated through email regarding their selection.

Payment of Course Fee: Once you receive the intimation from the Course Coordinator, the fee (as applicable) need to be paid.

The participation fees for taking the course is as follows:

Students from Academic Institutions: Rs. 5000

Faculty from other Academic Institutions: Rs. 10,000

Professionals from Industry/ Research Organizations: Rs. 15,000

Participants from abroad: US $500

The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges (if any). The participants will be provided with accommodation on payment basis.

The details of fee payment by Electronic Clearing Service/ RTGS

Account name	IITD CEP ACCOUNT
Bank Name	State Bank of India
Branch Name & Address	IIT Delhi, Hauz Khas, New Delhi – 110016
IFS Code	SBIN0001077
MICR Code	110002156
Type of Account	Saving Account
Bank Account No.	36819334799
SWIFT Code	SBININBB547
IITD PAN No.	AAATI0393L

Fill up the registration form (Given at the end of this brochure), by providing details of the bank transaction. Send the registration form to the Course coordinator at pradyum@am.iitd.ac.in (S. Pradyumna) on or before 15th November 2018.

The faculty

Prof. Dr. –Ing. Dietmer Gross, TU Darmstadt, Germany

Professor Dr.-Ing. Gross was appointed in 1976 as a Professor of Mechanics at the Department of Mechanics of the Technische Universität Darmstadt. Since 2006 he is Professor at the Department of Civil- and Environmental Engineering. He served 8 years as elected Dean of the Mechanics Department, 6 years as Director of the Mechanics Institute and 18 years as member of the Senate of the University. He authored or coauthored 16 books including Engineering Mechanics, Fracture Mechanics, Structural Mechanics and Wave Propagation and more than 350 refereed papers in journals and conference proceedings. His current research interests include the dynamic behavior of smart materials like ferroelectrics, ferroelectrets or nanomagnets. Dr. Gross served as Associate Editor and as reviewer for various journals, including the JMPS, IJSS, IJF, ZAMM or EJMA. He served as reviewer for most of the important science foundations, including DFG (Germany), NSF (USA), FWF (Austria), NSF (China), CRC (Canada) or EPSRC (GB). He organized several conferences as for example ECF3, Euromech 402 and IWCMM 12. He has been awarded with a von Humboldt Research Award and he is a member of the Polish Academy of Sciences

Local coordinator:

S. Pradyumna is an Associate Professor at the Department of Applied Mechanics, Indian Institute of Technology Delhi. His research is primarily focused on mechanics of composite structures. His research interests also include functionally graded materials, dynamics and stability of plate and shell panels, thermal shock. He has published more than twenty papers in international peer reviewed journals. More details in http://web.iitd.ac.in/~pradyum/ Email: pradyum@am.iitd.ac.in