

About the Speakers

Dr. M. Ramji is an Professor and HOD in Department of Mechanical and Aerospace Engineering at IIT Hyderabad. He has completed masters and Ph.D. in Mechanical Engineering from IIT Madras. Dr. M. Ramji's research interest is related to optical methods for engineering analysis, applied finite element analysis, fracture mechanics, mechanics of composites and material characterization.



Dr. Gangadharan Raju is an Associate professor in Department of Mechanical and Aerospace Engineering at IIT Hyderabad. He obtained PhD from IISc Bangalore and Post-doctoral from University of Bristol. His research interest is related to non-destructive testing and evaluation, Structural Health Monitoring, and design of composite structures, applied fem.

Dr. Syed Nizamuddin Khaderi is an Assistant professor in Department of Mechanical and Aerospace Engineering at IIT Hyderabad. He obtained PhD from the University of Groningen and Postdoc from University of Cambridge and Institute of High-Performance Computing, Singapore. His research interest is related to computational solid mechanics, impact loading of structures and fluid-structure interaction.



Dr. Chintapenta R Viswanath is an Assistant professor in Department of Mechanical and Aerospace Engineering at IIT Hyderabad. He obtained his PhD from Brown University and Post-doctoral from (ABAQUS-DSS) Dassault Simulia System, Providence-RI and IISc Bangalore. His research interest is in computational solid mechanics.

About IIT Hyderabad

Inventions and innovations are keywords on which the foundation of IITH is based. One of India's eight new IITs – IITH started functioning in August 2008. Currently it has 1050 students in total and offers undergraduate programs in four disciplines, M.Sc. in Chemistry and Physics, M.Tech in six disciplines and PhD in 11 disciplines.

The first faculty at IITH joined in 2009 and as of today IITH has 150 faculty members. In a short span of three years, IITH has developed state-of-the-art infrastructure for advanced research and produced more than 400 publications in internationally reputed journals.

Research is a culture among the faculty and students of IITH. This is evident from the several research projects that are ongoing at IITH. On top of the gamut of sponsored projects from various funding agencies, IITH has active collaboration with industry as well.

IITH also has an innovative academic program where the students are offered fractional credits and the first semester undergraduates are allowed to do a project of their choice. Many more innovations in the academic front are in the offing. IITH always strives to offer an innovative environment where one is not afraid to experiment with high-risk ideas.

<http://teqip.iith.ac.in/workshops/teaching-solid-mechanics/>

For details please contact:

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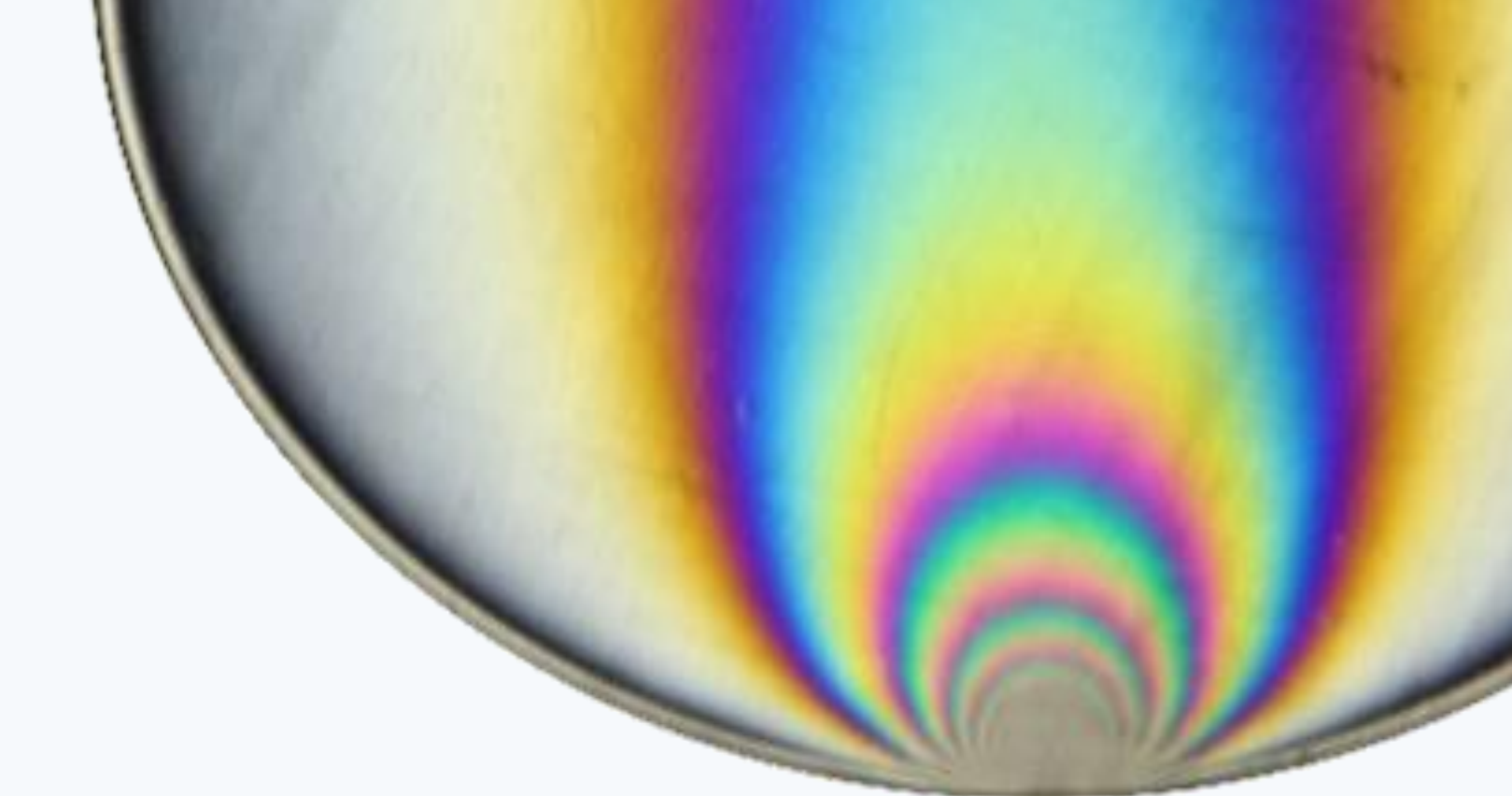
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5 DAYS WORKSHOP ON

Aid of demo experiments in teaching solid mechanics

Demonstration of experiments for teaching concepts in solid mechanics

26th Oct – 30th Oct 2020

SPONSORED BY: TEQIP

Venue : Online



भारतीय प्रौद्योगिकी संस्थान हैदराबाद
Indian Institute of Technology Hyderabad

INDIAN INSTITUTE OF TECHNOLOGY HYDERABAD

OVERVIEW

Solid Mechanics is an important branch of continuum mechanics and is fundamental for most of the engineering disciplines. It is the study of the deformation behaviour of solid materials under the action of force. Performing experiments in solid mechanics courses is an effective way for students to understand and appreciate the complicated concepts of mechanics. "I hear and forget: I see and I remember: I do and I understand" (Confucius, Chinese philosopher). Apart from experiments, finite element method (FEM) is a numerical framework to solve boundary value problems in solid mechanics domain. Industrial engineers as well as academic researchers both extensively use FEM to solve complex engineering problems. Most of the people use commercial software or in-house codes and they do not often understand the method as applied to engineering problems, especially in generating input data and interpreting the results.

COURSE OBJECTIVES

The major objective of this workshop is to expose the attendee to the three areas of mechanics- theory, experimentation and computation. An effective experimental demonstration such as doing a tensile test can help in teaching fundamental concepts. The concepts like stress concentration and stress intensity factor for cracks in fracture mechanics can be effectively understood and taught using the experimental technique like photoelasticity. This course is intended to provide faculties in aerospace, automotive, civil, mechanical, material science engineering an aid to perform demo experiments in teaching solid mechanics and some advanced courses like fracture mechanics, composites to appreciate complex material behaviour. A practicing engineer typically faces several issues on the usage of the FEM. Among them, firstly, which technique to choose that are appropriate for a given problem at hand. Secondly, how to interpret the output. And how reliable is the result obtained through FEM. This course is also designed such as to address few of these issues. The course is aimed at faculty who are teaching or plan to teach solid mechanics, finite element method, fracture and fatigue, impact mechanics, composites and non destructive testing. This is also aimed at researchers who are using or plan to use commercially available finite element packages to analyse problems in the aeronautical, automobile, mechanical, civil and other engineering industries. The course will also enable participants to perform basic experiments and computations to teach solid mechanics and other subjects.

BENEFITS OF ATTENDING THE WORKSHOP

Persons who have attended the course and followed the material should benefit in strengthening their background in the following areas

1. Performing experiments to effectively teach courses like solid mechanics, fracture mechanics, composites etc.
2. Fabrication of specimens for photoelasticity and digital image correlation studies and fabrication of composite specimens.
3. An improved understanding of the mechanics involved in impact, fatigue etc.
4. A strong understanding of the formulative steps involved in the fem development of the equations of engineering and applied science.
5. Generation of finite element data (e.g., selection of elements and mesh, computation of nodal forces), imposition of boundary conditions, post computation of stresses and strains, etc.), exploitation of problem symmetries, and interpretation and evaluation of the results.

COURSE CONTENTS

Experimental mechanics

The workshop will focus on the experimental demonstrations for teaching solid mechanics. Experimental techniques like photoelasticity (specimen fabrication and experimentation), digital image correlation (generation of speckle pattern and experimentation) will be covered. Material characterization is also included.

Composite materials

The workshop will also focus on the analysis of composite materials. Topics that will be covered include introduction, fabrication, mechanics, finite element analysis and experimental characterisation of composite materials.

Finite Element Method

The topics that will be covered include introduction to FEM, 1-D, 2-D and 3-D FEM, modeling and analysis. Hands-on session for Matlab programming of finite elements and tutorial sessions on a commercial finite element software.

Other Topics

1. Basics: introductory solid mechanics, introduction to non destructive testing (NDT), introduction to stability.
2. Impact mechanics and high strain rate characterization
3. Special topics: fatigue, fracture and repair.

IMPORTANT DATES



REGISTRATION FEE DETAILS

Participants from *TEQIP* sponsored institutes

There is no fee for participants from *TEQIP* sponsored colleges. The nominations along with the registration forms have to be sent through their coordinator to office.teqip@iith.ac.in. Please contact the volunteers for any query regarding the course.

VOLUNTEERS

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