Prof. Singiresu S. Rao

Prof. Singiresu S. Rao is distinguished Professor in Mechanical and Aerospace Engineering at University of Miami, Coral Gables, Florida, USA.

He is internationally known for his pioneering contributions in the areas of finite element and meshfree methods, multiobjective optimization, uncertainty models in engineering analysis, design and optimization, reliability based design, , optimization and reliability of renewable energy systems. He introduced new fields of research known as "cooperative game theory in design" (1978), "fuzzy optimization" (1987),"fuzzy finite element analysis" (1995), "fuzzy boundary element analysis" (2001) and "fuzzy mesh-free methods" (2012) by publishing the first papers in these areas. He presented the first applications of interval methods to engineering analysis and optimization in 1997 and 2002, respectively. Since 1995, Prof. Rao has been demonstrating the application of evidence theory (Dempster-Shafer theory) to optimization and uncertainty analysis of engineering systems. In 2009, he presented an evidence-based approach for the safety analysis of uncertain systems. Prof. Rao has authored over 200 journal papers (mostly in ASME and AIAA Journals) and 8 text books.

Such an eminent record of research has earned Prof Rao numerous national and international awards, including the Worcester Reed Warner Medal of American Society of Mechanical Engineers for outstanding contributions to the permanent literature of engineering through his highly popular books and numerous trendsetting research papers, Design Automation Award from American Society of Mechanical Engineers, Eliahu L. Jury Award for excellence in research from University of Miami, Distinguished Probabilistic Methods Educator Award from Society of Automotive Engineers (SAE) International.

Prof. Singiresu S. Rao can be contacted by email on srao@maimi.edu

Prof. Hem Chander Garg

Prof. Hem Chander Garg is presently working as Professor in Mechanical Engineering at Guru Jambheshwar University of Science & Technology, Hisar, India. He served as Chairman of Mechanical Engineering Department of Guru Jambheshwar University of Science & Technology, Hisar during the period 2004-2014. Presently he is serving as Director of 'Centre for Industry Institute partnership'. He has vast teaching & research experience.

Tokyo University of Science, Japan invited Prof. Garg as visiting Associate Professor in the year 2009. He has visited countries like USA, Germany, Japan and China for academic purposes. Prof. Garg's research interests include machine design, tribology & finite element method. Presently, he is working on two research projects "Development of Aerostatic Bearings for Ultraprecision Machining" and "Development of Water Lubricated Hybrid Bearings for Ultra-Precision Machine Tool Spindle". He has authored several research papers which have been published in SCI journals. Prof. Garg is life member of Tribology Society of India and Malaysian Tribology Society of Malaysia.

About GJUS&T, Hisar

The University holds the pride of place being the first ever technical University in Haryana and has a glorious past of twenty two years. The objectives of the University as enshrined in the University Act are to facilitate and promote studies and research in emerging areas of higher education with focus on new frontiers of Technology, Pharmacy, Environmental Studies, Non-conventional Energy Sources, Mass Media and Management Studies and also to achieve excellence in these and connected fields.

Right since its inception, the University has taken a number of steps to promote quality technical education and has already made a mark in definite academic areas that contribute to promote quality education in the present global competitive environment. As a result of these efforts taken together, this University was accredited with "A-Grade" by National Assessment and Accreditation Council (NAAC) in 2002, again in 2009 and third time in 2014. Therefore, this University is the one among few universities in India that have earned academic admiration by having three-times "A-Grade" University especially in the field of technical education.

Research is a culture among the faculty and students of GJUS&T. Qualified, dedicated and inspired faculty known for its research capabilities having an H-index equal to 65 enables it to be amongst top Indian Universities. This is evident from the several research projects that are ongoing at GJUS&T.

The University is housed in sprawling 372 acres where modern engineering meets exotic nature to create extremely beautiful, soothing and inspiring environment blending modernity with traditions not only in looks but in every walk of life. It is named after Guru Jambheshwar Ji Maharaj, a Saint and an Environmentalist of 15th Century. It is situated at Hisar which is about 167 Kms. from Delhi on NH-10 and is at a distance of about 231 Kms. from Chandigarh on NH-65.

http://www.gjust.ac.in
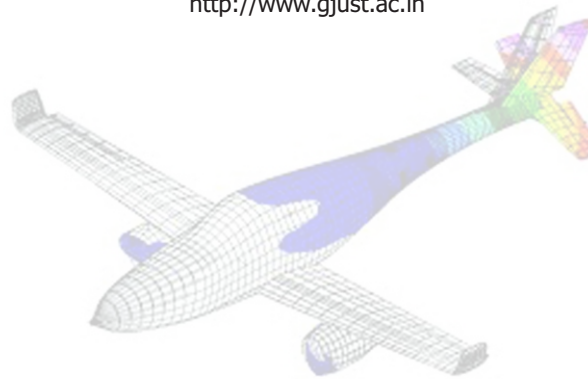
For details please contact

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GLOBAL INITIATIVE ON ACADEMIC NETWORK

One Week Course on

The Finite Element Method In Engineering:

Basic Procedure, Applications and Current Research Topics

December 18-22, 2017

Venue

Mechanical Engineering Department
GURU JAMBHESHWAR UNIVERSITY OF SCIENCE & TECHNOLOGY
HISAR-125001, HARYANA (INDIA)

Overview

The finite element method is a numerical method that can be used for the solution of complex engineering problems. Over the past few decades, it had been perfected and so well established that today, it is considered to be one of the best method for solving a variety of practical problems efficiently. Most of the users rely on commercial software for solving sophisticated engineering problems. The users do not often understand the finite element method as applied to engineering problems, especially in generating input data and interpreting the results.

This course is designed to understand the theory of the finite element method and its applications to solid and structural mechanics, aerospace structures, machine design, heat transfer, fluid mechanics, tribology and acoustics problems. In addition, an introduction to the current research topics of extended finite element method (XFEM), augmented finite element method (AFEM), Multi-scale finite element method, Stochastic and Fuzzy FEM, Mesh-free methods and their potential applications will be presented. The course will have strong emphasis on practical implementation aspects including hands-on experience with MATLAB FEM programs.

Course Objectives

The primary objectives of the course is to provide the participants fundamental understanding of Finite Element Method. At the end of the course, the participants are expected to have:

(i) A clear understanding of the formulation steps involved in the finite element model development of the equations of engineering and applied science, including certain solid and structural mechanics, aerospace structures, machine design, vibration, heat transfer, fluid mechanics, tribology and acoustics problems.
(ii) The ability of generation of finite element data, imposition of boundary conditions, post-computation, exploitation of problem symmetries, interpretation and evaluation of the results.
(iii) The ability to develop MATLAB finite element programs for solving engineering problems.
(iv) Exposure to current research topics of extended finite element method (XFEM), augmented finite element method (AFEM), Multi-scale finite element method, Stochastic and Fuzzy FEM, Mesh-free methods and their potential applications.
(v) Exposure to use commonly used commercial finite element software (such as ANSYS, ABAQUS and NASTRAN) for solving engineering problems.

Profile of Participants

The course is aimed at students and faculty members from reputed academic institutions; Engineers, scientists, analysts and researchers from manufacturing, services and government organizations including R&D laboratories who are involved with the analysis of differential equations arising in engineering and applied science, and who are using or plan to use commercially available finite element packages to analyze problems in the Mechanical Engineering, Civil Engineering, Aerospace Engineering, Applied Mathematics, Applied Mechanics and other engineering industries. Some knowledge of the finite element method is an advantage, but not essential.

Benefits of Attending the Course

A person on successful completion of the course would be benefited by strengthening his/her background in the following areas:

- A strong understanding of the formulative steps involved in the finite element model development of the equations of engineering and applied science, including certain solid and structural mechanics, aerospace structures, heat transfer and fluid flow problems.
- Generation of finite element data, exploitation of problem symmetries, and interpretation and evaluation of the results.

Course Material and Reference Book

A copy of the overheads used in the presentation of the course will be provided as a part of the course material. "The finite element method in engineering" book by SS Rao is available and the participants may purchase the book from local vendors. The reference information on the book is Rao, Singiresu S., "The Finite Element Method in Engineering", 5th Edition, Elsevier Butterworth-Heinemann, Boston, MA, 2011.

Evaluation and Grading

There will be evaluations on the understanding of the concepts by the participant made during the course. Based on the evaluations finally a letter grade will be awarded to the participant. A completion certificate shall also be issued.

Course Contents

Introduction
- Overview of finite element method
- Basic concepts
- A brief review of history and recent developments
- General applicability of the method

Basic Procedure
- Discretization of the physical problem
- Selection of interpolation functions
- Higher order and isoparametric elements

Introduction to Solution of Practical FEM Problems Using Available Software
- Overview of some commonly used commercial finite element software (such as ANSYS, ABAQUS and NASTRAN) and MATLAB-based finite element programs for solving engineering problems. Numerical examples

Methods of Deriving Finite Element Equations
- Derivation of finite element equations using equilibrium and variational methods (Including Rayleigh-Ritz, Galerkin and Least squares approaches)
- Strong and weak form formulations

Solution of Finite Element Equations
- Application of different types of boundary conditions
- Methods of solving finite element equations
- Solution methods for equilibrium problems
- Eigenvalue and propagation problems

MATLAB Programs for Finite Element Analysis
- Hands-on experience in developing the MATLAB finite element programs for the solution of linear system of equations and incorporation of boundary conditions

Applications to Solid and Structural Mechanics Problems
- Application to different types of solid mechanics and structures problems
- Analysis of trusses and frames

Applications to Aerospace Structures and Mechanical Design
- Analysis of aerodynamically induced stresses and flutter of thin walled structures
- Analysis of machine design and vibration problems

Solution of Solid and Structural Mechanics Problems Using MATLAB
- Hands-on experience in developing the MATLAB finite element programs for solving solid mechanics and structures problems

Applications to Fluid Flow Problems
- Application to fluid mechanics problems
- Analysis of fluid flow over bodies such as an airfoil and lubrication problems

Application to Heat Transfer and Other Types of Engineering Mechanics Problems
- Application to heat transfer problems
- Solution of general ordinary differential equations and partial differential equations

Solution of Fluid Mechanics and Heat Transfer Problems Using MATLAB
- Hands-on experience in developing the MATLAB finite element programs for solving fluid mechanics and heat transfer problems

Recent Developments and Current Research Activity
- Overview of extended finite element method (XFEM), Augmented finite element method (AFEM), Multi-scale finite element method and their potential applications

Uncertainty-Based Finite element methods and Mesh-Free methods
- Stochastic and Fuzzy FEM
- Mesh-free methods and their potential applications

Development of MATLAB programs for lubrication problems
- Hands-on experience in developing the MATLAB mesh free programs for solving lubrication problems

Important Dates

Last date for receiving applications:	December 11, 2017
Intimation to short-listed participants:	December 13, 2017
Course Dates:	**December 18-22, 2017**

Registration

Step 1: One-Time Registration at GIAN Portal

In order to register for any course under GIAN, candidate will have to go for one-time registration at GIAN Portal of IIT Kharagpur using the following steps:
- Create login and password at **http://www.gian.iitkgp.ac.in/GREGN/index**
- Login and complete the Registration Form
- Select Course
- Confirm your application and payment information
- Pay ₹ 500/- (one-time fee and non-refundable) through online payment gateway
- Download and print 'PDF file' of your enrolment application form for your personal records and copy of the same to be sent to the Course Coordinator

Step 2: Institute Registration

Institute registration process is an offline process. Interested candidates are requested to fill up the attached Registration Form.

Registration Fee (Non-refundable):

- Foreign delegates : $ 500
- For participants from academic institutions : ₹ 2500/-
- For participants from industry : ₹10,000/-

The Registration Fee includes access to attend all the lectures/tutorials, registration kit with a hardbound copy of the course material.
- The Registration fee has to be paid via Demand Draft in favour of **Registrar, Guru Jambheshwar University of Science & Technology, Hisar payable at Hisar.**
- Scan copy of the filled Registration Form along with the scan copy of Demand Draft must be sent via E-mail to Course Coordinator at hcgarg@gmail.com on or before December 11, 2017.
- Hard copy of the above mentioned documents must reach to the Course Coordinator on or before December 13, 2017.

Accommodation

Limited accommodation in the University guest house & hostels would be available on payment basis on prior request, subject to the availability OR otherwise participants will have to make their own stay arrangement.

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ON
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(Sponsored by: GIAN-MHRD, Govt. of India)

REGISTRATION FORM

Personal Information: (write in capital letters)

1) Name of the Participant: Mr./Ms./Mrs./Dr./Prof._____

2) Gender:_____

3) Date of Birth:_____

4) Academic Qualification & Designation: _____

5) Institution/Organization: _____

6) Address for Communication:_____

   _____

7) E-Mail ID:_____

8) Mobile Number(s):_____

Payment by Demand Draft in favor of Registrar, Guru Jambheshwar University of Science & Technology, Hisar payable at Hisar
Demand Draft details:

9) Demand Draft No.:_____ Bank Name_____

10) Amount Paid (in Rs. &words):_____

11) Date:_____ Place: _____

Accommodation Information:

12) Accommodation Required (Yes/No): _____

- I will pay the amount for food and accommodation during the course days.
  (Note: GIAN is not providing food and accommodation for the participants)

Signature of the Participant

Duly Filled Registration form along with original DD should be sent to following Address:

Prof. Hem Chander Garg
Coordinator-GIAN Course on FEM
Mechanical Engineering Department
Guru Jambheshwar University of Science & Technology
Hisar (Haryana) PIN-125001