اطلاعیه

(کارگاه آموزشی تخصصی اجزای محدود غیرخطی توسط پروفسور ردی (جدید

دفتر همکاریهای علمی بین المللی
دانشگاه صنعتی خواجه نصیرالدین طوسی برگزار می‌کند

کارگاه آموزشی تخصصی اجزای محدود غیرخطی (Nonlinear Finite Elements)

توسط: پروفسور ردی Professor J. N. REDDY

سرفصل کارگاه آموزشی و توضیحات بیشتر

از کلیه دانشجویان مقاطع کارشناسی ارشد و دکتری و اعضای محترم هیات علمی دانشگاه ها که در رشته های عمران، **مکانیک و هوا-فضا** مشغول تحصیل یا تدریس هستند و نیز مهندسین باتجربه شاغل در زمینه هایی که غیر خطی بودن محاسبات و سیستم ها بشدت در آنها حاکم می باشد مانند : خودرو سازی، نفت (حفاری در آبهای عمیق) و **بیومکانیک** (مدل رگ مصنوعی انسان) و ... جهت شرکت در این دوره تخصصی دعوت به عمل می آید.

هزینه ثبت نام ۹۵۰.۰۰۰ تومان می باشد که با توجه به محدود بودن ظرفیت پذیرش، اولویت با عزیزانی است که زودتر ثبت نام کنند.

فرم ثبت نام

مکان: دانشکده مکانیک دانشگاه صنعتی خواجه نصیرالدین طوسی (میدان ونک – خیابان ملاصدرا – خیابان پردیس)

زمان: ۳ تا ۵ و ۷ تا ۹ آذرماه ۱۳۹۳

مدت دوره : ۳ روز پیاپی

دفتر همکاریهای علمی بین المللی

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Research Webpage

Curriculum Vitae

Research Interests

Professor Reddy is well-known for his research as well as for his teaching. Professor Reddy is distinctly known for his research on mechanics of composite materials and of computational methods, which deals with theoretical formulations and numerical analysis of problems in engineering. The shear deformation plate and shell theories that he developed and bear his name are well known and finite element models have been implemented into commercial software like ABAQUS, NISA, and HYPERFORM, which are accessible to engineers around the world. Professor Reddy has also contributed significantly to the modernization of our education, since his books are used as text books in courses of Mechanical, Civil and Aerospace Engineering and Mechanics. An especially strong point of Dr. Reddy's classroom teaching is the clarity and physical insight of explanations of even the most difficult topics through relevant engineering examples, but without compromising on the mathematical rigor.

Such an eminent record of research has earned Dr. Reddy numerous national and international awards, including the Charles Russ Richards Memorial Award and the Worcester Reed Warner Medal of the American Society of Mechanical Engineers, Nathan M. Newmark Medal from the American Society of Civil Engineers; Award for Excellence in the Field of Composites and Distinguished Research Award from the American Society for Composites, the Computational Solid Mechanics award from US Association for Computational Mechanics, and the Archie Higdon Distinguished Educator Award from the American Society of Engineering Education. Dr. Reddy presented the prestigious "The 2009 Landis-Epic Lecture" at the University of Pittsburgh, and received Honorary degrees from the Technical University of Lisbon, Portugal, and Odlar Yurdu University, Baku, Azerbaijan. Recently, he was honored as an Honorary Member of the American Society of Mechanical Engineers. Dr. Reddy is one of the very few researchers in engineering around the world, who is recognized by ISI Highly Cited Researchers (with over 10,000 citations and h-index of 50).

Professor Reddy also played active roles in professional societies as the President of USACM, founding member of the General Council of IACM, Secretary of Fellows of AAM, member of the Board of Governors of SES, Chair of the Engineering Mechanics Executive Committee, among several others. He either served or currently serving on the editorial boards of a large number of journals. In addition, he served as the Editor of *Applied Mechanics Reviews*, *Mechanics of Advanced Materials and Structures*, the *International Journal of Computational Methods in Engineering Science and Mechanics*, and the *International Journal of Structural Stability and Dynamics*.

Awards & Honors

Honorary Member, American Society of Mechanical Engineers (ASME), Nov. 2011.

Honorary Doctorate Degree, Odlar Yurdu University, Baku, Azerbaijan, September 2011.

Life Fellow, American Society of Mechanical Engineers (ASME), June 2011.

Award for Career Achievement, presented by the organizers of the ACE-X 2010, Paris, France, July 2010.

The 2009 Landis-Epic Lecture (presented once in 5 years), Department of Civil and Environmental Engineering, University of Pittsburgh, Pittsburgh, March 20, 2009.

Education

Post Doctoral Fellow, Texas Institute for Computational Mechanics, University of Texas at Austin, 1973-1974.

Ph.D., Engineering Mechanics (Advisor: Dr. J. T. Oden), University of Alabama in Huntsville, Alabama, 1973.

M.S., Mechanical Engineering, Oklahoma State University, Stillwater, Oklahoma, 1970.

B.E. (5yr Course), Mechanical Engineering, Osmania University, Hyderabad, Andhra Pradesh, India, 1968.

Selected Publications

J. N. Reddy, "Microstructure-dependent couple stress theories of functionally graded beams," Journal of the Mechanics and Physics of Solids, Vol. 59, pp. 2382-2399, 2011 (doi:10.1016/j.jmps.2011.06.008).

G. S. Payette and J. N. Reddy, "On the Roles of Minimization and Linearization in Least Squares Finite Element Models of Nonlinear Boundary-Value Problems," Journal of Computational Physics, Vol. 230, No. 9, pp. 3589-3613, 2011, doi:10.1016/j.jcp.2011.02.002.

R. Aghababaei, S. P. Joshi, and J.N. Reddy, "Nonlocal Continuum Crystal Plasticity with Internal Residual Stresses," Journal of the Mechanics and Physics of Solids, Vol. 59, pp. 713-731, 2011.

Douglas P. Wickert, Robert A. Canfield, and J. N. Reddy, "Least-Squares Continuous Sensitivity Shape Optimization for Structural Elasticity Applications," AIAA Journal, Vol. 48, No. 12, pp. 2752-2762, December 2010.

M. Amabili and J. N. Reddy, "Non-linear Higher-order Shear Deformation Theory for Large-amplitude Vibrations of Laminated Doubly Curved Shells," International Journal of Non-Linear Mechanics, Vol. 45, No. 4, pp. 409-418, 2010.

A Three-Day Workshop on

ADVANCED FINITE ELEMENT ANALYSIS

(with Applications to Solid Mechanics, Fluid Mechanics, and Heat Transfer)

24-26 and 28-30 November 2014

TEHRAN, IRAN

Course Instructor/Lecturer

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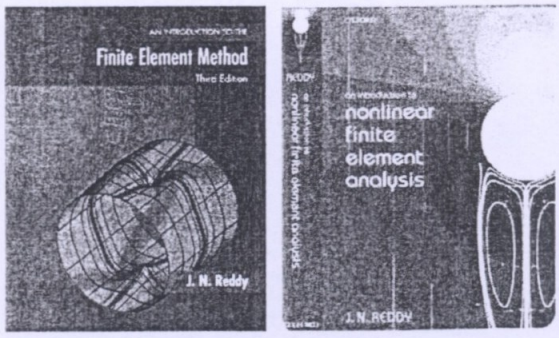

ABOUT THE COURSE

BACKGROUND

This course is intended to provide engineers/scientists working in academia as well as in engineering industries with the theory of the finite element method and its use in the solution of problems from solid and structural mechanics, fluid mechanics and heat transfer. The present course is designed to bridge the gap between the theoretical finite element knowledge and its industrial applications by providing sufficient insights into the relationship between the physical data (e.g., loads, boundary conditions, constitutive behavior, etc) and the finite element model. The course will also enable participants to be able to write their own finite element software. Participants are assumed to have knowledge of the basic principles of solid mechanics, heat transfer, and fluid mechanics. Some exposure to theory and/or applications of the finite element method is an advantage but not essential.

PROFILE OF PARTICIPANTS

The course is aimed at engineers/scientists who are involved with modeling of problems involving structural elements, fluid flow, and heat transfer in commercial environment and who intend to use commercially available finite element packages to analyze their engineering problems. The course will also enable participants to be able to write their own FEM software. Participants are assumed to have knowledge of the basic principles of structural mechanics, fluid mechanics and heat transfer. Some knowledge of the finite element method is an advantage, but not essential.

BENEFITS OF ATTENDING THE COURSE

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

- A *strong* understanding of the formulative steps involved in the finite element model development of problems of solid and structural mechanics, and certain heat transfer and fluid flow problems.
- 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.
- The ability to write a finite element computer module for a physical problem (e.g., user-specified subroutine for a commercial program).
- The ability to read and evaluate technical proposals/reports/papers on the finite element analysis of problems in engineering.
- The knowledge to teach the finite element analysis procedures to others.

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 following finite element books are suggested as references:

1. J. N. Reddy, *An Introduction to the Finite Element Method*, 3rd ed., McGraw-Hill, New York, 2006.
2. J. N. Reddy, *An Introduction to Nonlinear Finite Element Analysis*, Oxford University Press, Oxford, UK, 2004.
3. J. N. Reddy and D. K. Gartling, *The Finite Element Method in Heat Transfer and Fluid Dynamics*, 3rd ed., CRC Press, Boca Raton, FL, 2010.

COURSE CONTENTS‡

DAY 1

- **Background: Introduction to Numerical Methods**
  - General remarks
  - Mathematical models and numerical methods
  - Methods of approximation
  - Need for integral statements
  - Classical variational methods
  - Basic features of FEM

- FE Analysis of One-Dimensional Problems involving 1 DoF
  - Model differential equation
  - Finite element discretization
  - Development of weak forms
  - Primary and secondary variables
  - Essential and natural boundary conditions
  - Finite element model

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‡This is only a tentative schedule; the actual schedule may change

- **Bending of Beams**
  - Euler-Bernoulli beams: theory, weak form, and FE Model
  - Assembly of element equations
  - Illustrative example and discussion
  - Timoshenko beams: theory, weak forms, and FE Models
  - Shear locking and remedy

- **Generalization of the basic concepts to two dimensions**
  - Generalization of the basic concepts to two dimensions
  - Membrane and heat transfer-like problems in 2D
  - Weak form development
  - Finite element model development
  - Elements types (triangular and quadrilateral elements)
  - Numerical examples
  - Transient analysisSubparametric, isoparametric, and superparametric formulations
  - Axisymmetric problems
  - Numerical integration (2-D)

DAY 2

- **2-D Elasticity Problems**
  - Governing equations of plane elasticity problems
  - Weak formulations and principles of virtual displacements
  - Elements types (triangular and quadrilateral elements)
  - Numerical examples

- **3-D Elasticity and Heat Transfer Problems**
  - 3-D Elasticity problems
  - 3-D Heat transfer problems
  - Axisymmetric problems
  - Types of 3-D Finite elements (interpolation functions)

- **Introduction to Nonlinear Problems (1-D)**
  - Geometric and material non-linearity
  - 1-D Nonlinear problems (including beams)
  - Computation of tangent coefficient matrices
  - Solution algorithms for non-linear equations
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- **Nonlinear Problems in 2-D**
  - Nonlinear finite element model
  - Computation of tangent coefficient matrices
  - Solution algorithms for non-linear equations

DAY 3

- **Nonlinear Formulations of Plate Bending Problems**
  - Shear deformation plate elements
  - Membrane locking
  - Tangent stiffness calculations
  - Post-computation of strains and stresses

- **Continuum Formulations**
  - Review of continuum mechanics
  - Total and updated Lagrangian descriptions
  - Degenerated thick shell element
- **Finite Element Models of Viscous Flow Problems**
  - Governing equations (Navier-Stokes Equations)
  - Mixed finite element model (2D)
  - Penalty finite element model (2D)
  - Numerical examples

Professional Highlights of the Instructor (J. N. Reddy)

http://isihighlycited.com/ and http://www.tamu.edu/acml

Dr. Reddy is a Distinguished Professor and inaugural holder of the Oscar S. Wyatt Endowed Chair in Mechanical Engineering at Texas A&M University. Dr. Reddy is a prolific researcher in theoretical and computational mechanics. The shear deformation plate and shell theories that he developed and bear his name are well known and finite element models he developed have been implemented into commercial finite element commercial software like ABAQUS, NISA, and HYPERFORM. Dr. Reddy has been recognized with numerous national and international awards (in addition to many institutional awards), including the Worcester Reed Warner Medal and the Charles Russ Richards Memorial Award of the American Society of Mechanical Engineers, the Nathan M. Newmark Medal and Raymond D. Mindlin medal from the American Society of Civil Engineers; Award for Excellence in the Field of Composites and Distinguished Research Award from the American Society for Composites; the Computational Solid Mechanics award from US Association for Computational Mechanics, and the IACM Award from the International Association of Computational Mechanics. Dr. Reddy also received *Honoris Causa*, a honorary degree from Technical University of Lisbon, Portugal. As a result of Dr. Reddy's extensive publications of archival journal papers and books in wide range of topics in applied sciences and engineering, Dr. Reddy is one of the selective researchers in engineering around world who is recognized by ISI Highly Cited Researchers with over 13,000 citations (without self-citations over 15,000) with h-index of over 58 as per Web of Science, 2013; as per Google Scholar the number of citations is over 39,000 and h-index is 77. A more complete resume with links to journal papers can be found at (this web site lists only highly cited researchers in engineering around the world):

http://isihighlycited.com/ or **http://www.tamu.edu/acml.**