Short term course on
Aeroelasticity - Fundamentals and Topics on Nonlinear Problems (171034L08)

November 12-16, 2018

Overview

Aeroelasticity is a challenging field of engineering that deals with fluid-structure interaction problems of elastic bodies surrounded by airflows. Particularly, the interaction of inertial, structural and aerodynamic forces on aircraft, buildings, surface vehicles etc., with the paramount importance on aerospace and automotive industry, the field of aeroelasticity is also relevant on many other parts of general engineering. The content of the lectures cover the mathematical modeling of aeroelastic problems, from basic to industrial applications, special topics on specific fluid-structure modeling, fundamentals on computational tools applied to aeroelastic analysis, and topics on nonlinear aeroelastic problems on aircraft, helicopters, wind turbines, blunt-bodies instabilities, and bridges aeroelasticity.

Objectives

The primary objectives of the course are as follows:

i. Exposing participants to state of the art in the principles of aeroelasticity and its phenomena: divergence, flutter, dynamic buffeting, vortex and stall induced vibrations.

ii. Enlightening the participants to the physical problems involved in the fluid-structure interactions and nonlinear aeroelastic analysis.

iii. Providing insight into the industrial applications of aeroelasticity in the fields, like, aerospace, automotive and general engineering.

iv. Enhancing the capability of participants to apply the design principles for the fundamental unsteady aerodynamic models: analytical and numerical solutions.

v. Providing exposure to practical problems and probable solutions through case studies and tutorials.

Modules	**Lectures** : Aeroelastic Phenomena: Divergence, flutter, dynamic response, Galloping and buffeting, Vortex and stall-induced vibrations, fluid-structure interaction, Modal analysis of complex structures, Computational analysis of natural modes, Unsteady aerodynamics, Divergence and flutter prediction, Nonlinear Aeroelasticity; Hopf bifurcation, transonic dip phenomena, Shock buffet problems, Airfoil with structural nonlinearities **Tutorials :** Hands on basic mathematical tools applied to system dynamics and related to fluid-structure interaction problems, Computational analysis of natural modes and coupling methods to fluid-structure modeling, Unsteady aerodynamics: indicial responses convolution, panel methods, CFD, Aeroelastic analysis of a wing divergence and flutter, Nonlinear aeroelastic analysis of airfoil with structural nonlinearities **Number of participants for the course will be limited to Fifty.** The **last date** to apply for the course is **October 12, 2018 (Friday)**
You Should Attend If...	• Executives, engineers and researchers from mechanical and civil engineering design centers and government organizations including R&D laboratories and industry. • Students at all levels (B.Tech/M.Sc./M.Tech/Ph.D). • Post-doctoral fellows and Faculty from reputed academic and technical institutions who are engaged in teaching and research related to design, composite structures, aerospace and solid mechanics fields.
Fees	**Participants from abroad** : USD 500 **Industry participants** : INR 10,000 **Faculty/Research staff from other Institutions** : INR 5,000 **PhD scholars/Students from other Institutions** : INR 3,000 **Faculty/PhD scholars/Students from NITK** : INR 2,000 The above fee includes all instructional materials and working lunch. The outstation participants will be provided with limited accommodation (shared) on payment basis.
Steps for Registration	(i) Prospective participants have to register first on GIAN Portal (http://www.gian.iitkgp.ac.in/GREGN/index) by paying Rs. 500 /- (One time non-refundable GIAN Portal registration fee). (ii) Select the course from the list of courses available in the portal. Register for the course selected. (iii) Fill the registration form and E-mail the scanned copy to subhaskatti@gmail.com. (iii) Mode of payment: **DD** for registration fee in favour of the **Director NITK Surathkal**, payable at Surathkal/Mangalore through any Nationalized Bank. **DD must reach to** *Dr. Subhaschandra Kattimani, Associate Professor, Dept. of Mechanical Engineering, National Institute of Technology Karnataka, Surathkal, PO Srinivasnagar 575025, Mangalore, Karnataka* by post **on or before 1st November 2018.**

The Faculty

Prof. Flávio D. Marques

Prof. Flávio D. Marques is an Associate Professor in the Department of Mechanical Engineering at the Engineering School of São Carlos of the University of São Paulo (EESC/USP). His research interests have been concentrated on linear and non-linear aeroelasticity, aeronautical smart structures, non-conventional control systems, applications of neural networks, fuzzy logic, and genetic algorithms in aerospace problems. In particular, on the issues relevant to aeroelasticity and smart aeronautical structures. He has over 120 research articles published in international journals and conferences. Dr. Marques has received a positive review of his works and grants from public national Brazilian agencies to support research, as the Brazilian National Council for Scientific and Technological Development (CNPq), holding CNPq productivity grant level 2, and São Paulo State Research Foundation (FAPESP). He is currently involved with research collaborations with groups in the Virginia Tech, USA (Prof. Muhammad R. Hajj), Univ. of Porto, Portugal (Prof. António J. M. Ferreira), and Technologic Institute of Aeronautics (Prof. Domingos A. Rade) from the Brazilian Ministry of Defense (*Instituto Tecnológico de Aeronáutica*), São José dos Campos, SP, Brazil

Course Co-coordinators

Dr. Subhaschandra Kattimani   **Dr. S. M. Murigendrappa**

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