Helicopter Rotor Dynamics and Design

Overview

The main rotor of a helicopter generates all the forces necessary for flight, including thrust, propulsive force and transient forces for maneuvers. The long and slender rotor blades undergo large de-formation and there is significant coupling between aerodynamics and structural dynamics. The blade dynamics is dominated by the effect of centrifugal acceleration. The helicopter rotor in edgewise flight experiences a complex flow field, featuring strong blade tip vortices, time-varying freestream velocity and blade motion. As a result, the design of the main rotor, in terms of aerodynamics as well as structural dynamics, has a profound effect on the performance and stability of the helicopter as well as on the vibratory forces generated in hover and in forward flight. Understanding the principles underlying the aeroelastic behavior of a helicopter rotor is key to rotor design.

The primary objectives of the course are:

i) Understanding the fundamentals of helicopter rotor blade aerodynamics and dynamics.
ii) Calculating trim, performance and vibratory loads of a rotor.
ii) Exploring the effect of rotor blade design variables on the performance, dynamics and stability.
iv) Experimental techniques for measurement of rotor performance, loads and stability.

Logistics	**Course timeline: January 1 – 5, 2018** **Location: IIT Kanpur Extension Centre, Noida** **Number of participants for the course will be limited to 30.**
You Should Attend If…	▪ you are an aerospace engineer or research scientist interested in or involved in research related to helicopter rotor dynamics. ▪ you are interested in fundamentals of design of rotary wing vehicle. ▪ you are a student or faculty (BTech/MSc/MTech/PhD) from academic institution interested in undertaking research in the area of helicopter
Fees	The participation fees for taking the course is as follows: **Participants from abroad : US $500** **Public Sector Industry/ Govt. Research Organizations: Rs. 15000/-** **Private Industry: Rs.20000/-** **Faculty: Rs. 3000/-** **Students: Rs. 1000/-** The participants will be provided with accommodation on payment basis.

The Faculty

Dr. Sirohi is an Associate Professor and recepient of Eli H. Ramona Thornton Centennial Fellowship in Engineering at Department of Aerospace Engineering and Engineering Mechanics, University of Texas at Austin. He got his BTech in Aerospace Engineering from IIT Madras and his MS and PhD from the University of Maryland at College Park. Before joining the Cockrell School of Engineering in Fall 2008, Dr. Sirohi worked at Sikorsky Aircraft Corporation where he was a Staff Engineer in the Advanced Concepts group. At UT Austin, Dr. Sirohi works on projects related to smart material sensors, experimental aerodynamics and structural dynamics, energy harvesting and rotary-wing aeroelasticity.

Dr. Abhishek is an Assistant Professor in the Department of Aerospace Engineering at IIT Kanpur. He got his BTech in Aerospace Engineering from IIT Kharagpur and his MS and PhD from the University of Maryland at College Park. His research interests include rotary wing aeromechanics, autonomous unmanned aerial systems, wind turbines and advanced VTOL concepts.

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