AE 230 Jan 3:0

Aeroelasticity

Instructor

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Department: Aerospace Engineering

Course Time: M,W,F; 09:00 - 10:00

Lecture venue: AE 106

Detailed Course Page:

Announcements

Brief description of the course

Aeroelasticity is the study of the interactions between the elastodynamics of a flexible lifting surface with the dynamics of the fluid flow over it. The issues that are of concern in this study include stability of the aeroelastic system, its static and dynamic response, and controlling these aeroelastic instabilities and response.

Prerequisites

A graduate level course in solid and/or fluid mechanics and/or control theory.

Syllabus

Overview of aeroelasticity; Finite state modeling of aeroelastic systems; Static aeroelasticity: Effect of wing flexibility on lift distribution, Torsional wing divergence, Effect of wing flexibility on control effectiveness; Dynamic aeroelasticity: Vibration; Binary flutter; Aeroserovoelasticity: Ternary and quaternary flutter, active control; Dynamics of flexible aircraft; Flexible aircraft pitching derivative; Flexible aircraft heave, pitch, and roll response to control surface deflection; Gust models and gust response of aircraft.

Course outcomes

After completing this course, the student should be able to understand and identify the nature of the aeroelastic

problems encountered in flight vehicles, and choose the appropriate methods and tools to estimate and solve specific aeroelastic problems.

Grading policy

4 assignments, each having 10% weightage in the overall evaluation; 2 sessional exams, each with 10% weightage; a term paper with 20% weightage; and an end-semester exam having 20% weightage.

Assignments

Resources

[1]. J. R Wright and J. E. Cooper. Introduction to Aircraft Aeroelasticity and Loads. John Wiley and Sons, U. K., 2007.

[2]. C. Nam, Y. Kim, and T. A. Weisshaar. Computational Aids in Aeroser-
voelastic Analysis Using MATLABT(TM). 2001.