

AE 6200 AEROELASTICITY

Catalog data: AE 6200 Aeroelasticity 3-0-3. Prerequisite: AE 6030.

Understanding and analysis of aeroelastic phenomena in fixed wing aircraft, static aeroelasticity, dynamic aeroelasticity, and dynamic response and transient stresses in aircraft structures.

I. Introduction. Collar's Triangle, types of aeroelastic problems. Concept of aeroelastic operators. (2 hours)

II. Static aeroelasticity:

- Lift distribution and divergence speed: twisting of a typical wing section, straight wing in a wind tunnel, straight wing aircraft, swept wing aircraft. (6 hours)
- Aileron effectiveness and reversal: typical wing section with aileron, straight wing aircraft, swept wing aircraft. (6 hours)

III. Dynamic aeroelasticity

- Review of vibration problems. (2 hours)
- Static and dynamic instabilities: the follower force problem, the supersonic panel flutter problem. (3 hours)
- Flutter of a typical wing section. (2 hours)
- Review of unsteady aerodynamic theories. (2 hours)
- Parameter effect on wing flutter. (2 hours)
- Flutter of a straight wing. Flutter of a straight wing aircraft. Effect of wing sweep. (6 hours)
- Flutter of control surfaces. (1 hour)

IV. Dynamic response and transient stresses: Dynamic response of an aircraft; Aircraft gust problems; Transient stresses in aircraft.

- Introductory problem: dynamic response and transient stresses in landing gears. (2 hours)
- Dynamic response and transient stresses in aircraft. (6 hours)
- Aircraft response to gusts. The sharp edged gust. (2 hours)
- Response of an elastic aircraft to a discrete gust. (3 hours)

Reference Books

Bispligoff R. L., Ashley H., and Halfman R.L.: Aeroelasticity. Addison-Wesley Publishing Company, 1955.

Bispligoff R. L., and Ashley H.: Principles of Aeroelasticity. Dover Publication, Inc, New-York. 1962.

Dowell E.H.: A Modern Course in Aeroelasticity. Sijthoff & Noordhoff International Publishers, Alphen aan den Rijn, The Netherlands, 1978.