



## **Introduction to Aeroelasticity**

(ME diploma degree course)

### **Course Objectives**

The aim of the lecture is to provide a basic understanding of the effects of aerodynamic forces on flexible aircraft with the main emphasis on physical basics of aeroelastic phenomena and standard analytical and numerical solution techniques.

After the course students will

- know the main aeroelastic problems in aircraft engineering
- understand the physical background of basic aeroelastic phenomena and their effect on aircraft structures
- be able to analyse the response of flexible aircraft to the interaction of aerodynamic and mechanical forces by using classical analytical as well as numerical solution methods.

### **Course Topics:**

The course includes following topics:

- Classification of aeroelastic phenomena
- Static aeroelastic problems (divergence, control surface reversal) of rigid wing sections elastically mounted
- Static aeroelastic problems (divergence, control effectiveness) of flexible wings with high aspect ratios
- Tail efficiency of airplanes with slender fuselages
- Longitudinal static stability of airplanes with slender fuselages
- Dynamic aeroelasticity (classical flutter)

**Class Schedule:** 2 hours per week (2 hours lecture)

**Credits:** 3 ECTS credit points (3 LP)

**Offered:** in fall/winter term (*Wintersemester*; October - February)

### **Prerequisites:**

Basic courses in *aerodynamics, structural mechanics and flight mechanics*

**Course Material:**

Course material is provided on the web page:

<http://tu-dresden.de/ilr/lft/studium/aeroelastik>

Instructions on how to download this material are given during the first lecture.

**Further reading:**

Hodges, D.H.; Pierce, G.A.

*Introduction to Structural Dynamics and Aeroelasticity*, Cambridge University Press, Cambridge, 2<sup>nd</sup> Ed., 2014

Rossow, C.; Wolf, K.; Horst, P.

*Handbuch der Luftfahrzeugtechnik*, Hanser Verlag, 2014

Megson, T.H.G.

*Aircraft Structures for Engineering Students*, Elsevier Ltd., Oxford, 5<sup>th</sup> Ed. 2012

Dowell, E.H. et al.

*A Modern Course in Aeroelasticity*, Kluwer Academic Publishers, Dordrecht, 4<sup>th</sup> rev. Ed., 2004

Bisplinghoff, R.L.; Ashley, H.; Halfman, R.L.

*Aeroelasticity*, Dover, New York, 2<sup>nd</sup> Ed., 1996

Fung, Y.C.

*An Introduction to the Theory of Aeroelasticity*, Dover, New York, Rev. Ed., 1993

Försching, H.-W.

*Grundlagen der Aeroelastik*, Springer, Berlin, 1976

**Assessment:** Written examination (90 minutes)