



Grundlagen der Aeroelastik & Konstruktionsprojekt

(Fundamentals of Aeroelasticity & Design project)

Degree program: Mechanical Engineering diploma degree

Program module: MB-LRT-20 - Aeroelastik (*Aeroelasticity*)

Course objectives:

The aim of the course 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 content:

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)

The course includes a compulsory design project (Konstruktionsprojekt Aeroelastik).

Class schedule: 3 hours per week (2h lecture, 1h design project)

Credits: 4 ECTS credit points / 4 LP (2cp lecture, 2cp project)

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

Prerequisites:

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

Course material:

The course material can be found at:

<https://tu-dresden.de/ing/maschinenwesen/ilr/lft/studium/wise/ael>

Download instructions are provided in the course.

Further reading:

Megson, T.H.G.

Aircraft Structures for Engineering Students, Elsevier Ltd., Oxford, 6th Ed., 2016

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

Introduction to Structural Dynamics and Aeroelasticity, Cambridge University Press, Cambridge, 2nd Ed., 2014

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

Handbuch der Luftfahrzeugtechnik, Hanser Verlag, München, 2014

Dowell, E.H. et al.

A Modern Course in Aeroelasticity, Kluwer Academic Publishers, Dordrecht, 4th rev. Ed., 2004

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

Aeroelasticity, Dover, New York, 2nd 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) & project report