ME-608	**Methods of asymptotic analysis in mechanics**
	Monkewitz Peter

Cursus	Sem.	Type
Mechanics		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Oral presentation
Workload	60h
Hours	**28**
Courses	21
Exercises	7
Number of positions	

Frequency

Every 2 years

Remark

Next time: Spring 2019 / Min 8 participants

Summary

The introduction to asymptotic analysis provides the basis for constructing many simplified analytical models in mechanics and for testing computations in limiting cases.

Content

The following topics are covered:

- Problem solutions in terms of series and asymptotic series
- Ordering parameters and asymptotic analysis
- Asymptotic approximation of integrals (methods of stationary phase and of steepest descent applied to Fourier inversions, etc.)
- Singular perturbations - Matched asymptotic expansions (generalized boundary layer approximation) with examples (correction to Stokes drag of a sphere, etc.)
- Multi-scale methods with examples (flows with "slow" streamwise evolution such as developed flow in a tube with variable properties, waves evolving in slowly varying media, etc.)

Note

The course is principally based on the book "Perturbation Methods in the Computer Age" by David C. Wilcox (ISBN 0963605127 -- published 1995 by DCW Industries, La Canada, California)

Keywords

asymptotic expansions, singular perturbations, multiple scales, WKB

Learning Prerequisites

Important concepts to start the course

Analysis