Fachbereich Maschinenbau und Verfahrenstechnik
Faculty of Mechanical and Process Engineering

Organisation

Dozent(in)/Dozenten/*Lecturer*	Prof. Dr. A. C. Benim
Vorlesung/Übung (2/2 SWS) *Lecture/Exercise*	Zeit und Ort nach Vereinbarung (*time and place by arrangement*) Voraussichtlich online Sprechstunden (*likely with online sessions*)
Workload	180h | 60h (Präsenzzeit/*attendance time*) | 120h (Selbststudium/*self-study*)
Credits	6 LP
Teilnahmevoraussetzungen *Participation requirements*	Master-Studiengang „Mechanical Engineering“
Maximale Teilnehmerzahl *Participant limit*	10
Prüfungsform *Type of examination*	Written or oral examination (will be announced) (assuming that it is possible, otherwise as recommended by direction)
Sprache/*Language*	English
Online-Ressourcen	Werden zur Verfügung gestellt/*will be made available*

Contents

- Governing eqution and boundary conditions
- Introduction to turbulence phenomenon
- Turbulent flows in nature and engineering
- Vortex stretching, energy cascade, turbulence eddies
- Mechanisms and characterization of turbulence
- Reynolds averaging, the Schwarz inequality
- The probability density function
- Statistically staeady and unsteady flows
- Favre averaging, Morkovin‘s hypothesis
- Ensamble averaging, phase averaging
- Filtering
- Turbulence kinetic energy, turbulence intensity
- Homogeneous turbulence, isotropic turbulence
- Dissipation rate and length scales
- Two-point correlation functions, integral scales
- Spectral density, turbulence energy spectrum
- Near-wall turbulent flows
- Direct numerical simulartion
- Turbulent viscosity models
- Reynolds stress models
- Large eddy simulation
- Hybrid models

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Literature

S. B. Pope, Turbulent Flows,
Cambridge University Press, 2011