Aerodynamics

Special Subjects
Elective 2 credit

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1. Course Description

Aerodynamics is a key academic research area for developing, designing, manufacturing, operating and maintaining airplanes, aero-engines, gas turbines, steam turbines, fans, blowers, compressors, automobiles and trains. Students will study a well-established textbook and be given exercises dealing with practical problems. Through this series of lectures on aerodynamics, students will acquire abilities to find, to analyze and to solve problems and technical communication skills. These technical abilities and skills are essential for students who wish to become expert engineers or researchers in this field. Students will be able to acquire the knowledge, skills, abilities and attitudes described in the diploma policy DP1 and DP2.

2. Course Objectives

The goals of this course are to understand the fundamental ideas and introduction methods of basic equations of aerodynamics and to acquire applied skill for defining problems and introducing equations to bring solutions for actual engineering issues in the related fields.

3. Grading Policy

The learning results are evaluated according to exercises (50%) during the lectures and reports (50%). All reports are evaluated and returned to the students. The evaluation results are explained by the lecturer. All exercises are explained during lecture time.

4. Textbook and Reference

Textbook
H. W. Liepmann and A. Roshko Elements of Gas Dynamics paperback edition
ISBN 978-0-486-41963-3
Electronic publishing is available.

Dover Publications, Mineola, New York

5. Requirements(Assignments)

Students are required to prepare the lectures by reading the textbook and consulting reference literature beforehand. Students are also required to review lectures and exercises. Students will need at least one hours for preparation and one hour for review except lecture time.

6. Note

Students need to bring their own textbook and calculator for each lecture and exercise.
Students can see the text book and own handwritten note books during each exercise.
Students can use their laptop personal computer for each lecture and exercise.

7. Schedule

[1] Introduction, Concepts from thermodynamics 1 Perfect gas
[2] Concepts from thermodynamics 2 Adiabatic reversible process
[3] Concepts from thermodynamics 3 Entropy
[4] One-dimensional gasdynamics 1 Continues equation
[5] One-dimensional gasdynamics 2 Energy equation
[6] One-dimensional gasdynamics 3 Shock wave equations
[7] One-dimensional wave motion 1 Wave equation
[8] One-dimensional wave motion 2 Sound speed
[9] Waves in supersonic flow
[10] The method of characteristics (chapter 12)
[11] Flow in ducts and wind tunnels 1 Fundamental equations
[12] Flow in ducts and wind tunnels 2 Supersonic nozzle theory
[13] Flow in ducts and wind tunnels 3 Design of a supersonic nozzle
[14] Methods of measurement
[15] Report evaluations and discussions