

SPC 407 Supersonic and Hypersonic Fluid Dynamics (3 Cr)

Course Contents

Lectures

1. Introduction to Experimental Aerodynamics
2. Introduction to Compressible Flow
3. Conservation Equations for Inviscid Flows
4. One-Dimensional Flow
5. One-Dimensional Flow with Heat Addition and Friction
6. Oblique Shocks
7. Expansion Waves
8. Quasi-One-Dimensional Flow
9. Numerical techniques for Steady Supersonic Flow
10. Hypersonic Flow
11. Properties of High-Temperature Gases
12. High-Temperature Flows: Basic Examples
13. Computational Fluid Dynamic Solutions of Hypersonic Flows

Homework

There will be approximately 5 homework assignments distributed throughout the semester.

Matlab and Fluent Assignment

There will be approximately 6 Matlab and Fluent assignments distributed throughout the semester.

Project

There will be a computer project assigned that will include a written report and presentation to class mates. The project will include ANSYS Fluent Assignments.

Textbooks:

Anderson, "Modern Compressible Flow", 3rd Edition, published by McGraw Hill

Anderson, "Hypersonic and High Temperature Gas Dynamics", 2nd Edition, published by the American Institute of Aeronautics and Astronautics

ANSYS Software

ANSYS Student version can be downloaded from: <http://ansys.com/student>

Office Hours

Dr. Ahmed Elmekawy: Sunday 10:40 to 11:40 am and Monday 11:00 am to 12:00 pm

Eng/ Ahmed Sabry: Tuesday 1:00 to 4:00 pm

Approximate Grading Weights

Homework Assignments	: 10%
Matlab and Fluent Assignments	: 15%
Midterms	: 30% (2 Midterms)
Project	: 15%
Final Exam	: 30%