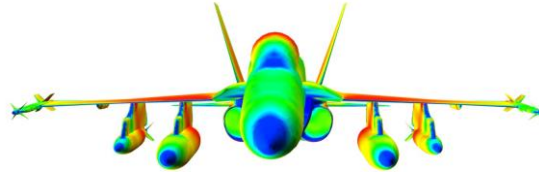
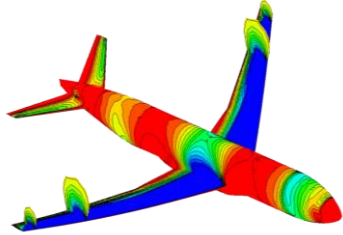


AA 214: Numerical Methods for Compressible Flows

Schedule: Autumn 23, M-W-F (2 of 3) 10:30 am – 11:50 am

Units: 3

Venue : McCullough 126



Course Description

This course is designed for M.S.-level students. It covers the hierarchy of mathematical models for compressible flows and an introduction to finite difference and finite volume methods for their computation.

Course Outline

Computational Fluid Dynamics: What is it? Why? What for? — Hierarchy of Mathematical Models — Conservation — Integral Forms and Discontinuities — Linearization — Characteristic Relations — Representative Model Problems — The Finite Difference Method — The Finite Volume Method — Treatment of Boundary Conditions — Linear and Nonlinear Stability Analyses — Error Analysis — Local Time-Stepping and Dual Time-Stepping.

Prerequisites

- ✚ Basic knowledge of linear algebra and ODEs (CME 206 or equivalent).

Textbooks and Other Reading Materials

- ✚ Culbert B. Laney, *Computational Gasdynamics*, CAMBRIDGE UNIVERSITY PRESS, ISBN 0-521-62558-0.
- ✚ C. Hirsh, *Numerical Computation of Internal and External Flows*, Volume 1 and Volume 2, WILEY, ISBN 978-0-471-92385-5 (Volume 1) and ISBN 978-0-471-92452-4 (Volume 2).
- ✚ John D. Anderson, Jr., *Computational Fluid Dynamics, The Basics with Applications*, MC GRAW HILL, ISBN 0-07-001685-2.
- ✚ Lecture notes and various reading materials.

Homeworks

- ✚ Assigned in general on a weekly basis.
- ✚ Subject to the Stanford Honor Code (no attempt to find and no consultation of any published solutions; collaboration with other students taking the course is allowed)

as long as it is limited to discussing the statement of the problem and how to proceed about solving it – everything else is an individual task).

Examination

- ✚ 24-Hour Take Home Final Exam.
- ✚ Subject to the Stanford Honor Code (no attempt to find and no consultation of any published solutions; no assistance from anyone/anything).

Course Grade

- ✚ Based 65% on the grades for the homework assignments.
- ✚ Based 35% on the grade for the Take Home Final Exam.
- ✚ In fairness to all and in order to enable a timely posting of the solutions: Homework assignments are due on time or will not be graded; Take Home Final Exam is administered only once, on the day posted during the first week of classes.

Instructor

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Office Hours: 1:00 pm – 2:00 pm on each lecture day and/or by appointment, Durand Building, Room 257.

Teaching Assistant

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E-mail: porrello@stanford.edu

Office Hours: 4:30 pm – 6:00 pm (M): Room 270
11:00 am – 12:30 pm (Tu): Room 023
2:30 pm – 4:00 pm (Th): Room 023

Students with Documented Disabilities

Students who may need an academic accommodation based on the impact of a disability must initiate the request with the Student Disability Resource Center (SDRC) located within the Office of Accessible Education (OAE). SDRC staff will evaluate the request with required documentation, recommend reasonable accommodations, and prepare an *Accommodation Letter* for faculty dated in the current quarter in which the request is being made. Students should contact the SDRC as soon as possible since timely notice is needed to coordinate accommodations. The OAE is located at 563 Salvatierra Walk (phone: 723-1066).