

NEW GRADUATE COURSE FOR SPRING, 2006

“Computational Methods for Multiphase Flow”

Instructor: Professor Meng-Sing Liou (on Sabbatical from NASA)

The objective of this course is to equip students with the basic theory and advanced techniques of multiphase flow computation, understand the issues involved in modeling and computation, and finally to have hands-on experiences by using numerical methods to write codes for simplified problems and using a production code to compute complex flows. The course will emphasize both theory and practice.

Topics to be covered are divided into three parts, each taking nearly equal amount of time (about three weeks).

Part I:

1. Fundamentals
 - a. Overview of theory and methods in hyperbolic conservation laws.
 - b. Overview of methods of computational fluid dynamics (CFD) and applications in compressible and incompressible (single-phase) flow.
 - c. Summary of relevant thermodynamics; description of fluid and phase properties.
2. Hierarchy of models and approaches in multiphase flow computations. Overview of potential applications and numerical issues.

Part II:

3. Direct numerical simulation of multi-fluid flow. Modern numerical methods for compressible flows. Techniques for interface treatment. Application of adaptive mesh refinement.

Part III:

4. Numerical methods for effective field models. Derivation of inter-penetrating continuum model equations and constitutive laws. Mathematical properties and numerical repercussions of effective field models. Current numerical approaches.

INSTRUCTION INFORMATION:

TR 9:30-10:45

Engr. II, room 3301

NOTE: Enrollment limited to 22

ENROLLMENT DETAILS:

Course number: ChE 594 (Special Topics)

Enrollment code: 04440

Instructor number: 37

Number of units: 3

Grade option: Letter Grade only