Planning Committee (all at the University of Michigan):
Prof. Claus Borgnakke
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FLOW VISUALIZATION TECHNIQUES, PRINCIPLES AND APPLICATIONS

Ann Arbor, Michigan, 16–18 August 1982 Fee: $500

Chairman: Wen-Jei Yang

Like the methods of flow measurements, flow visualization techniques have been extensively applied in the experimental study of flow phenomena in combustion, fluid flow, heat and mass transfer, fluid machinery, rheology, biology, medicine, oceanography, food technology, chemical processes, geophysics, and terrestrial and planetary atmospheres. However, in contrast to flow measurements, which have attracted considerable attention, flow visualization techniques have never been organized for classroom presentation.

This intensive course is intended for engineers, scientists, and researchers in industry and government who want to acquire a working knowledge of the most widely used methods of visualizing flows. Emphasis is placed on the physical principles and application of surface tracing, tuft, tracer, and optical methods.

The course includes a review of recent pertinent literature and new information on digital image processing and computer tomography.

Prerequisite

Participants should have a degree in engineering, science, or the equivalent experience.

Instructional program

A complete set of lecture notes for the course will be given to each attendee at registration in Ann Arbor. The notes supplement the six hours of lecture presented each day.

Course content

Direct injection methods. To visualize the velocity field from the motion or trace of observable foreign materials such as smoke, vapor, dye, particles and luminescence; selection of materials.

Surface tracing methods. To observe surface flow patterns using oil film, oil dot, sublimation, thermosensible paint, soluble chemical film and electrolytic etching.

Tuft methods. Use of surface tuft, depth tuft, tuft grid for visualizing the flow direction near a solid surface.

Chemical reaction methods. Interfacial reaction between reactants and electrolytic colouration by means of electrolysis.

Electrical control methods. Including hydrogen bubble, spark tracer and smoke wire techniques.

Optics of inhomogeneous fluids. Geometric optics, refraction and properties.

Atomic optics. Light-matter interaction and lasers.

Overview of optical methods. Interferometry, schlieren, shadowgraph, etc.

Holographic methods

Qualitative analysis. Infringe analysis, computer tomography, digital image processing.

Specialized Methods in Optical Diagnostics

Applications. Rheology, biomedicine, heat exchangers, fluid machinery, combustion, boundary-layer phenomena, oceanography, atmospheres, etc.

Staff

From the University of Michigan

Department of Mechanical Engineering and Applied Mechanics

Dr. Wen-Jei Yang, Prof., Course Chairman

Dr. Charles M. Vest, Prof.

Visiting Lecturers

Dr W. Merzkirch, Prof. Institut for Thermo und Fluiddynamik, Ruhr Universitat, Bochum, West Germany

Dr. D. Bershader, Prof. Department of Aeronautics and Astronomics, Stanford University, Stanford, California