knowledge (Part I) or information on the state of the art regarding applications in specialized industries (Parts IIA and IIB).

The courses aim at an interdisciplinary transfer of knowledge. Emphasis this year is on: numerical methods and codes; nuclear and non-nuclear severe accident phenomena; and oil–gas transport.

The lecturers

Sanjoy Banerjee, Professor at the Department of Chemical and Nuclear Engineering, University of California, Santa Barbara, U.S.A.

Michael L. Corradini, Professor of Nuclear Engineering and Engineering Physics at the University of Wisconsin, Madison, U.S.A.

Gad Hetsroni, Danciger Professor of Engineering at Technion—Israel Institute of Technology, Haifa, Israel.

Geoffrey F. Hewitt, Professor of Chemical Engineering at Imperial College of Science, Technology and Medicine, London, England.

Rene V. A. Oliemans, Head of the Fluid Flow Section at the Koninklijke/Shell Laboratorium in Amsterdam (KSLA) and Visiting Professor of Multiphase Flow at the Technical University of Delft, The Netherlands.

George Yadigaroglu, Professor of Nuclear Engineering at the Swiss Federal Institute of Technology in Zurich (ETHZ) and Head of the Thermal-Hydraulics Laboratory at the Paul-Scherrer Institute, Switzerland.

Contents of lectures

Part I. Bases

1. Introduction and basics
2. Basic equations
3. Flow regimes, pressure drop and void fraction
4. Two-phase flow in vertical pipes
5. Two-phase flow in horizontal and inclined pipes
6. Closure relationships
7. Two-phase heat transfer
8. Post-dryout heat transfer
9. Numerical methods
10. Multidimensional modelling
11. Computer codes
12. Instabilities in two-phase flow

Part IIA. Water Reactor Applications

13A. LOCA phenomena
14A. Severe accidents
15A. Codes for transient and accident analysis
16A. Severe accident codes
17A. Steam generators
18A. Vapor explosions

Part IIB. Process and Petroleum Industry Applications

13B. Multicomponent heat and mass transfer
14B. Emergency relief system vent sizing
15B. Two-phase flow in the petrochemical industry
16B. Dense gas and mist dispersions
17B. Oil/water/gas flows: characteristics and measurement
18B. Vapor-cloud explosions

For further information contact:

Professor G. Yadigaroglu
ETH-Zentrum
CH-8092 Zurich, Switzerland
Tel. (41-1) 256.4615

Call for Papers

9th CONFERENCE ON HEAT TRANSFER ORGANIZED BY UIT WITH THE COOPERATION OF THE UNIVERSITY OF PISA

The *9th Conference on Heat Transfer of the Italian Union of Thermofluiddynamics* will be held in the second week of June 1991 in Pisa, Italy. The exact location and date of the conference will be fixed shortly and communicated in a second announcement.

The themes of the conference are:

- Thermofluiddynamics of single and multi-phase systems.
- Thermofluiddynamics of nuclear plants and environmental systems.
- Experimental methods and innovative technologies in thermal exchange.

Submissions are welcome by authors from any country. Authors wishing to present a paper should submit two copies of an extended abstract, typewritten in Italian or English. These should be sent to:

Professor Sergio Faggiani
Dipartimento di Energetica
Facoltá di Ingegneria
Via Diotisalvi, 2
56126 Pisa
Italy
Tel. 0039 50 554128
Fax 0039 50 500987
0039 50 585265

The extended abstract of about 400 words must specify the aim of the research, the theoretical and/or experimental methods employed, original findings and a concise comparison with previous results. Authors of abstracts considered appropriate for the conference will be informed by **1 March 1991** and invited to send the final paper. These should reach Professor S. Faggiani by **15 April 1991**. All papers, excepting those which do not correspond to the extended abstracts, will be published in the conference proceedings.

TWO-PHASE GAS–LIQUID FLOW SHORT COURSE: PRINCIPLES FOR MODELLING GAS–LIQUID FLOW

Department of Chemical Engineering, University of Houston,
Houston, TX 77004, U.S.A.

22–26 July 1991

Description

The basic framework for modelling a wide variety of gas–liquid flow problems is now well-understood, much having been completed in recent years. This course will present this modern approach in sufficient detail so that those attending can apply the results to problems of design. In addition, this should prepare the participant to understand the new literature which emerges in the years to come.

This method first predicts the flow pattern. Then for each pattern, the flow behavior is modelled. Once this is done the modelling is extended to solve problems of heat and mass transport. Reliable data is important to an understanding of the mechanisms of two-phase flow. For this reason the course reviews some modern measuring methods as well as recent data.

The extensive facilities of the two-phase flow research laboratory will be made available to participants. Demonstrations will be conducted in the two-phase flow loops and special instrumentation techniques will be shown with hands on experiments. Interaction with the research team will be possible. Problem sessions are included in which the ideas developed in the course are applied to design. Extensive course notes and references on all materials presented will be provided.

Lecturers

A. E. Dukler: Ph.D. (Delaware) Professor of Chemical Engineering, University of Houston, Texas, U.S.A.

Y. Taitel: Ph.D. (Delaware) Professor, Department of Fluid Mechanics and Heat Transfer, Tel-Aviv University, Tel Aviv, Israel.

Course Outline

Monday 22 July—Introductory Concepts

- Occurrence and application of gas–liquid flow
- Effects of two-phase flow on transport
- The role of flow patterns
- Connections with older published methods
- Two-phase flow at zero gravity