TWO PHASE GAS–LIQUID FLOW SHORT COURSE

PRINCIPLES FOR MODELLING GAS–LIQUID FLOW

Department of Chemical Engineering, University of Houston,
University Park, Houston, Texas, U.S.A.

6–10 February 1989

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 6 February

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

Tuesday 7 February

Modelling Flow Pattern Transitions

- Horizontal and vertical pipes
- Effect of inclination
- Upward and downward flows
- Transient effects
- Boiling/condensation effects
- Tube bundles
- Transitions at zero gravity

Wednesday 8 February

Modelling Stratified Flows

- Holdup, pressure drop, heat transfer

Modelling Horizontal Slug Flows

- Hydrodynamics, frequency, heat transfer

Modelling Annular Flows

- Falling and rising films (hydrodynamics, heat transfer)
- Wave motion
- Interfacial shear and friction

Thursday 9 February

Modelling Flow Mechanics and Heat Transfer in Vertical Tubes

- Bubble flow
- Annular flow
- Natural slug flow
- Modelling for zero-gravity flows
- Terrain-induced slugging
- Transient flows: the two-fluid and the drift flux models

Friday 10 February

Modern Measuring Methods

- Flow pattern detection
- Drop and bubble size and velocity
- Film thickness and wave structure
- Heat transfer parameters

Arrangements

The course fee is $750.00, including notes, coffee and a class dinner. Limited accommodation is available at the University of Houston Hotel and at area motels and hotels.

Checks should be made payable to **University of Houston TPF Course**, and should be sent with your reservation to:

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

The last day for reserving space on the course is 10 January 1989.