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Fundamentals and Methods
Volume 1: Modeling of Gas Liquid Flow in Pipes
Edited by: **John R Thome** (Laboratory of Heat and Mass Transfer (LTCM), Switzerland & Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland)

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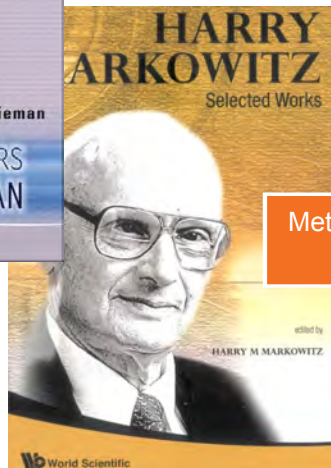
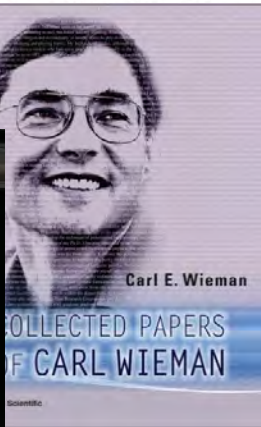
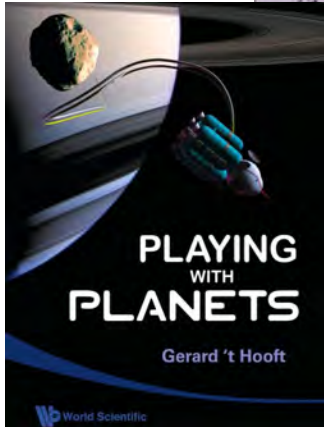
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Preface

Multiphase flow is quite a broad field, which incorporates a wide spectrum of subjects and disciplines such as distribution of dust in air, sediments transport in water, energy conversion systems, chemical processes and transportation of gas-liquid and liquid-liquid mixtures in open channels or closed conduits.

In this volume, we limit ourselves to gas-liquid two-phase flows in pipes. This subject by itself encompasses diverse areas which include:

- Application of advanced experimental techniques such as Image processing, PIV and Tomography, which yield experimental results on instantaneous flow fields in the phases, interfacial transport phenomena, dynamics of interfacial waves, wake structure and local turbulent parameters.
- Development of numerical methods and computational tools for simulating transient and multidimensional flows of gas-liquid mixtures in pipes.
- Development of simplified mechanistic models for the prediction of flow patterns, pressure drop, void fraction distribution and hydrodynamic characteristics of the two phases.

The goal of this volume is to introduce to the reader the basic classical solutions for gas-liquid flow in pipes and the approaches and methods for the solutions of two-phase flow characteristics. We present models, based on the physical mechanisms that govern various processes. These mechanisms have been arrived at through mathematical formulations that are capable of predicting flow patterns such as: flow pattern transition, hydrodynamic parameters of specific flow patterns, stability of gas-liquid interfaces, flooding inception, etc. These equations incorporate the effect of the operational and geometrical conditions of the two-phase flow system, as well as, the flow rates and the physical properties of the phases. Obviously the models need experimental verification. Whenever possible the predictive results were compared to experimental results. However,

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