

Microflows And Nanoflows Springer

Subject of my thesis is a study of rheologic and dynamic properties of fluids confined in an isotropic pore network with pore radii of approx. 5nm embedded in a monolithic silica matrix (porous Vycor). The experimental technique bases on the capillary rise of a wetting liquid in a porous substrate, also known as spontaneous imbibition. A crucial part of the conducted experiments centers on the increasing relevance of the liquid-substrate interface in the mesopore confinement. Detailed analyses of the measurements carried out with water, silicon oils, and a series of hydrocarbons result in precise information on the boundary conditions expressed in terms of the velocity slip length. Systematic variations of the chain-length of the used hydrocarbons also allow for an assessment of the influence of the shape of the liquid's building blocks on the nanoscopic flow behavior. Supplemental forced throughput experiments additionally address the impact of the liquid-substrate interaction. Furthermore, the influences of spatial confinement on the surface freezing transition of the linear hydrocarbon n-tetracosane as well as on the mesophase transitions of the liquid crystal 80CB are investigated. Finally, a third, more general study focuses on the kinetics of the invasion front, which is supposed to be influenced significantly by the random environment of the pore space considered.

This book is a printed edition of the Special Issue "Non-Linear Lattice" that was published in Entropy

The most teachable book on incompressible flow– now fully revised, updated, and expanded Incompressible Flow, Fourth Edition is the updated and revised edition of Ronald Panton's classic text. It continues a respected tradition of providing the most comprehensive coverage of the subject in an exceptionally clear, unified, and carefully paced introduction to advanced concepts in fluid mechanics. Beginning with basic principles, this Fourth Edition patiently develops the math and physics leading to major theories. Throughout, the book provides a unified presentation of physics, mathematics, and engineering applications, liberally supplemented with helpful exercises and example problems. Revised to reflect students' ready access to mathematical computer programs that have advanced features and are easy to use, Incompressible Flow, Fourth Edition includes: Several more exact solutions of the Navier-Stokes equations Classic-style Fortran programs for the Hiemenz flow, the Psi-Omega method for entrance flow, and the laminar boundary layer program, all revised into MATLAB A new discussion of the global vorticity boundary restriction A revised vorticity dynamics chapter with new examples, including the ring line vortex and the Fraenkel-Norbury vortex solutions A discussion of the different behaviors that occur in subsonic and supersonic steady flows Additional emphasis on composite asymptotic expansions Incompressible Flow, Fourth Edition is the ideal coursebook for classes in fluid dynamics offered in mechanical, aerospace, and chemical engineering programs.

This volume comprises the proceedings of the 42nd National and 5th International Conference on Fluid Mechanics and Fluid Power held at IIT Kanpur in December, 2014.The conference proceedings encapsulate the best deliberations held during the conference. The diversity of participation in the conference, from academia, industry and research laboratories reflects in the articles appearing in the volume. This contributed volume has articles from authors who have participated in the conference on thematic areas such as Fundamental Issues and Perspectives in Fluid Mechanics; Measurement Techniques and Instrumentation; Computational Fluid Dynamics; Instability, Transition and Turbulence; Turbomachinery; Multiphase Flows; Fluid-Structure Interaction and Flow-Induced Noise; Microfluidics; Bio-inspired Fluid Mechanics; Internal Combustion Engines and Gas Turbines; and Specialized Topics. The contents of this volume will prove useful to researchers from industry and academia alike.

Rheology and Dynamics of Simple and Complex Liquids in Mesoporous Matrices

Portable Biosensing of Food Toxicants and Environmental Pollutants

Fundamentals and Simulation

Levico Terme, Italy 2016

Micro/Nano Technology Systems for Biomedical Applications

Direct Modeling for Computational Fluid Dynamics

Microflows and NanoflowsFundamentals and SimulationSpringer Science & Business Media

This book presents the topology optimization theory for laminar flows with low and moderate Reynolds numbers, based on the density method and level-set method, respectively. The density-method-based theory offers efficient convergence, while the level-set-method-based theory can provide anaccurate mathematical expression of the structural boundary. Unsteady, body-force-driven and two-phase properties are basic characteristics of the laminar flows. The book discusses these properties, which are typical of microfluidics and one of the research hotspots in the area of Micro-Electro-Mechanical Systems (MEMS), providing an efficient inverse design approach for microfluidic structures. To demonstrate the applications of this topology optimization theory in the context of microfluidics, it also investigates inverse design for the micromixer, microvalve and micropump, which are key elements in lab-on-chip devices.

This book focuses on the modeling and analysis of heat and fluid flow in microchannels and micro-systems, compiling a number of analytical and hybrid numerical-analytical solutions for models that account for the relevant micro-scale effects, with the corresponding experimental analysis validation when applicable. The volume stands as the only available compilation of easy to use analytically-based solutions for micro-scale heat and fluid flow problems, that systematically incorporates the most relevant micro-scale effects into the mathematical models, followed by their physical interpretation on the micro-system behavior.

Multi-scale and multi-physics modeling is useful and important for all areas in engineering and sciences. Particle Methods for Multi-Scale and Multi-Physics systematically addresses some major particle methods for modeling multi-scale and multi-physical problems in engineering and sciences. It contains different particle methods from atomistic scales to continuum scales, with emphasis on molecular dynamics (MD), dissipative particle dynamics (DPD) and smoothed particle hydrodynamics (SPH). This book covers the theoretical background, numerical techniques and many interesting applications of the particle methods discussed in this text, especially in: micro-fluidics and bio-fluidics (e.g., micro drop dynamics, movement and suspension of macro-molecules, cell deformation and migration); environmental and geophysical flows (e.g., saturated and unsaturated flows in porous media and fractures); and free surface flows with possible interacting solid objects (e.g., wave impact, liquid sloshing, water entry and exit, oil spill and boom movement). The presented methodologies, techniques and example applications will benefit students, researchers and professionals in computational engineering and sciences --

Handbook of Chemical and Biological Plant Analytical Methods, 3 Volume Set

Nanofluidics (Second Edition)

Fluid Mechanics and Fluid Power – Contemporary Research

Fundamentals and Applications

Nanofluidics and Microfluidics

Communication Systems and Information Technology

This text focuses on the physics of fluid transport in micro- and nanofabricated liquid-phase systems, with consideration of gas bubbles, solid particles, and macromolecules. This text was designed with the goal of bringing together several areas that are often taught separately - namely, fluid mechanics, electrodynamics, and interfacial chemistry and electrochemistry - with a focused goal of preparing the modern microfluidics researcher to analyse and model continuum fluid mechanical systems encountered when working with micro- and nanofabricated devices. This text serves as a useful reference for practising researchers but is designed primarily for classroom instruction. Worked sample problems are included throughout to assist the student, and exercises at the end of each chapter help facilitate class learning.

Microfluidics for Pharmaceutical Applications: From Nano/Micro Systems Fabrication to Controlled Drug Delivery is a concept-orientated reference that features case studies on utilizing microfluidics for drug delivery applications. It is a valuable learning reference on microfluidics for drug delivery applications and assists practitioners developing novel drug delivery platforms using microfluidics. It explores advances in microfluidics for drug delivery applications from different perspectives, covering device fabrication, fluid dynamics, cutting-edge microfluidic technology in the global drug delivery industry, lab-on-chip nano/micro fabrication and drug encapsulation, cell encapsulation and delivery, and cell- drug interaction screening. These microfluidic platforms have revolutionized the drug delivery field, but also show great potential for industrial applications. Presents detailed coverage on the fabrication of novel drug delivery systems with desired characteristics, such as uniform size, Janus particles, and particular or combined responsiveness Includes a variety of case studies that explain principles Focuses on commercialization, cost, safety, society and educational issues of microfluidic applications, showing how microfluidics is used in the real world

This book provides in a concise form the principles and applications of flow microreactors in organic and polymer synthesis. Recently, it became possible to conduct chemical reactions in a flow reactor in laboratory synthesis. The flow microreactor enables reactions that cannot be done in batch, opening a new possibility of chemical synthesis. Extremely fast mass and heat transfer and high-resolution residence time control are responsible for the remarkable features of that process. The book is not an exhaustive compilation of all known examples of flow microreactor synthesis. Rather, it is a sampling of sufficient variety to illustrate the concept, the scope, and the current state of flow microreactor synthesis. Researchers both in academia and in industry will be interested in this book because the topics encompassed by the book are vigorously studied in many university and company laboratories today.

This volume encompasses prototypical, innovative and emerging examples and benchmarks of Differential-Algebraic Equations (DAEs) and their applications, such as electrical networks, chemical reactors, multibody systems, and multiphysics models, to name but a few. Each article begins with an exposition of modelling, explaining whether the model is prototypical and for which applications it is used. This is followed by a mathematical analysis, and if appropriate, a discussion of the numerical aspects including simulation. Additionally, benchmark examples are included throughout the text. Mathematicians, engineers, and other scientists, working in both academia and industry either on differential-algebraic equations and systems or on problems where the tools and insight provided by differential-algebraic equations could be useful, would find this book resourceful.

25th IFIP TC 7 Conference, CSMO 2011, Berlin, Germany, September 12-16, 2011, Revised Selected Papers

Computational Aerodynamic Modeling of Aerospace Vehicles

Analysis and Control of Mixing with an Application to Micro and Macro Flow Processes

Transient Chaos

Transport in Microfluidic Devices

From Nano/Micro Systems Fabrication to Controlled Drug Delivery

This volume includes extended and revised versions of a set of selected papers from the International Conference on Electric and Electronics (EEIC 2011) , held on June 20-22 , 2011, which is jointly organized by Nanchang University, Springer, and IEEE IAS Nanchang Chapter. The objective of EEIC 2011 Volume 4 is to provide a major interdisciplinary forum for the presentation of new approaches from Communication Systems and Information Technology, to foster integration of the latest developments in scientific research. 137 related topic papers were selected into this volume. All the papers were reviewed by 2 program committee members and selected by the volume editor Prof. Ming Ma. We hope every participant can have a good opportunity to exchange their research ideas and results and to discuss the state of the art in the areas of the Communication Systems and Information Technology.

Industrial mathematics is evolving into an important branch of mathematics. Mathematicians, in particular in Italy, are becoming increasingly aware of this new trend and are engaged in bridging the gap between highly specialized mathematical research and the emerging demand for innovation from industry. The contributions in this volume provide both R&D workers in industry with a general view of existing skills, and academics with state-of-the-art applications of mathematics to real-world problems, which may also be incorporated in advanced courses. Providing a clear guide that moves from molecules through to devices, this book shows how state-of-the-art micro- and nanotechnologies are already having an impact on human health, and presents the areas of research that will lead to the next generation of micro/nano-based systems for biomedical applications.

Detection of Pathogens in Water Using Micro and Nano-Technology aims to promote the uptake of nano-technological approaches by developing an integrated cost-effective nano-biological sensor for detection of bioterrorism and environmental assays.

Applications of Differential-Algebraic Equations: Examples and Benchmarks

Applied and Industrial Mathematics in Italy II

Microfluidics, Optics, and Surface Chemistry

Basics of Flow Microreactor Synthesis

Navier-Stokes Turbulence

Selected Papers from the 2011 International Conference on Electric and Electronics (EEIC 2011) in Nanchang, China on June 20-22, 2011, Volume 4

The Microfluidics and Nanofluidics Handbook: Two-Volume Set comprehensively captures the cross-disciplinary breadth of the fields of micro- and nanofluidics, which encompass the biological sciences, chemistry, physics and engineering applications. To fill the knowledge gap between engineering and the basic sciences, the editors pulled together key individuals, well known in their respective areas, to author chapters that help graduate students, scientists, and practicing engineers understand the overall area of microfluidics and nanofluidics. Topics covered include Cell Lysis Techniques in Lab-on-a-Chip Technology Electrods in Electrochemical Energy Conversion Systems: Microstructure and Pore-Scale Transport Microscale Gas Flow Dynamics and Molecular Models for Gas Flow and Heat Transfer Microscopic Hemorheology and Hemodynamics Covering physics and transport phenomena along with life sciences and related applications, Volume One: Chemistry, Physics, and Life Science Principles provides readers with the fundamental science background that is required for the study of microfluidics and nanofluidics. Both volumes include as much interdisciplinary knowledge as possible to reflect the inherent nature of this area, valuable to students and practitioners.

Porous silicon is rapidly attracting increasing interest from various fields, including optoelectronics, microelectronics, photonics, medicine, chemistry, and biosensing. This nanostructured and biodegradable material has a range of unique properties that make it ideal for many applications. For example, the pores and surface chemistry of the material can be manipulated to change the rate of drug release from hours to months. Porous Silicon:

Biomedical and Sensor Applications, Volume Two is part of the three-book series Porous Silicon: From Formation to Application. It discusses applications of porous silicon in bioengineering and in various sensors, including gas sensors, biosensors, pressure sensors, mechanical sensors, optical sensors, and many other types. It also thoroughly reviews the fabrication, parameters, and applications of devices that use porous silicon. Drawing upon a vast amount of recently published literature, the book guides readers through practical implementations that span environmental control, chemistry, spectroscopy, gas chromatography, microelectronics, micromachining,

microfluidics, medicine, biotechnology, and the car industry. It is divided into three sections that focus on: Types of sensors that use porous silicon Auxiliary devices that use porous silicon Biomedical applications such as drug delivery, tissue engineering, and in vivo imaging Representing the most recent progress in applications of porous silicon to biomedical and sensory technology, this reference is indispensable for those involved in the research, development, and application of porous silicon in several scientific disciplines. It also serves as a starting point for the interested but unfamiliar reader to gain a thorough understanding of the unusual properties of porous silicon, other porous materials, and possible areas for current and future applications.

Integrating nonequilibrium thermodynamics and kinetic theory, this unique text presents a novel approach to the subject of transport phenomena.

Biosensors are poised to make a large impact in environmental, food, and biomedical applications, as they clearly offer advantages over standard analytical methods, including minimal sample preparation and handling, real-time detection, rapid detection of analytes, and the ability to be used by non-skilled personnel. Covering numerous applications of biosensors used in food and the environment, Portable Biosensing of Food Toxicants and Environmental Pollutants presents basic knowledge on biosensor technology at a postgraduate level and explores the latest advances in chemical sensor technology for researchers. By providing useful, state-of-the-art information on recent developments in biosensing devices, the book offers both newcomers and experts a roadmap to this technology. In the book, distinguished researchers from around the world show how portable and handheld nanosensors, such as dynamic DNA and protein arrays, enable rapid and accurate detection of environmental pollutants and pathogens. The book first introduces the basic principles of biosensing for newcomers to the technology. It then explains how the integration of a "receptor" can provide analytically useful information. It also describes trends in biosensing and examines how a small-sized device can have portability for the in situ determination of toxicants. The book concludes with several examples illustrating how to determine toxicants in food and environmental samples.

Complex Dynamics on Finite Time Scales

Advanced Heat and Mass Transfer

Detection of Pathogens in Water Using Micro and Nano-technology

Microfluidics and Nanofluidics Handbook

Microflows

Particle Methods for Multi-Scale and Multi-physics

This book presents a series of challenging mathematical problems which arise in the modeling of Non-Newtonian fluid dynamics. It focuses in particular on the mathematical and physical modeling of a variety of contemporary problems, and provides some results. The flow properties of Non-Newtonian fluids differ in many ways from those of Newtonian fluids. Many biological fluids (blood, for instance) exhibit a non-Newtonian behavior, as do many naturally occurring or technologically relevant fluids such as molten polymers, oil, mud, lava, salt solutions, paint, and so on. The term "complex flows" usually refers to those fluids presenting an "internal structure" (fluid mixtures, solutions, multiphase flows, and so on). Modern research on complex flows has increased considerably in recent years due to the many biological and industrial applications.

Computational fluid dynamics (CFD) studies the flow motion in a discretized space. Its basic scale resolved is the mesh size and time step. The CFD algorithm can be constructed through a direct modeling of flow motion in such a space. This book presents the principle of direct modeling for the CFD algorithm development, and the construction unified gas-kinetic scheme (UGKS). The UGKS accurately captures the gas evolution from rarefied to continuum flows. Numerically it provides a continuous spectrum of governing equation in the whole flow regimes. Contents:Direct Modeling for Computational Fluid DynamicsIntroduction to Gas Kinetic TheoryIntroduction to Nonequilibrium Flow SimulationsGas Kinetic SchemeUnified Gas Kinetic SchemeLow Speed Microflow StudiesHigh Speed Flow StudiesUnified Gas Kinetic Scheme for Diatomic GasConclusion Readership: Undergraduate and graduate students, researchers and professionals interested in computational fluid dynamics.

Key Features:Direct modeling for CFD is self-contained and unified in presentationIt may be used as an advanced textbook by graduate students and even ambitious undergraduates in computational fluid dynamicsIt is also suitable for experts in CFD who wish to have a new understanding of the fundamental problems in the subject and study alternative approaches in CFD algorithm development and applicationThe explanations in the book are detailed enough to capture the interest of the curious reader, and complete enough to provide the necessary background material needed to go further into the subject and explore the research literatureKeywords:Direct Modeling;Unified Gas Kinetic Scheme;Boltzmann Equation;Kinetic Collision Model;Asymptotic Preserving Method

This book is a collection of thoroughly refereed papers presented at the 25th IFIP TC 7 Conference on System Modeling and Optimization, held in Dresden, Germany, in September 2011. The 55 revised papers were carefully selected from numerous submissions. They are organized in the following topical sections: control of distributed parameter systems; stochastic optimization and control; stabilization, feedback, and model predictive control; flow control; shape and structural optimization; and applications and control of lumped parameter systems.

The analysis and control of mixing is of great interest because of the potential for optimizing the performance of many flow processes. This monograph presents a unique overview of the physics, mathematics and state-of-the-art theoretical/numerical modeling and experimental investigations of mixing. It approaches the subject of mixing from many angles: presents theoretical and experimental results, discusses laminar and turbulent flows, considers macro and micro scales, elaborates on purely advective and advective-diffusive flows, and considers conceptual and industrial-relevant mixing devices. This monograph provides an essential reading for graduate students and postdoctoral researches interested in the investigation of mixing, and constitutes an indispensable reference for mechanical, chemical and aeronautical engineers, and applied mathematicians in universities and industries.

Topology Optimization Theory for Laminar Flow

Microfluidic Devices in Nanotechnology

Biomedical and Sensor Applications
 Micro- and Nanoscale Fluid Mechanics
 Non-Linear Lattice

Construction and Application of Unified Gas-Kinetic Schemes

The aim of this Book is to give an overview, based on the results of nearly three decades of intensive research, of transient chaos. One belief that motivates us to write this book is that, transient chaos may not have been appreciated even within the nonlinear-science community, let alone other scientific disciplines.

There has been significant growth in the field of nanofluidics, where nanoscale analytical instruments employ micromachined features and are able to manipulate fluid samples with high precision and efficiency and have many advantages over their conventional (larger) analogues. The new edition of Nanofluidics has been fully revised and updated with the latest advancements and applications. With a focus on bioanalysis, specific applications are given with case studies. The end of each chapter now also features a methodology section to explain experimental protocols and “tips and tricks”. The editors draw on an international authorship and provide a handbook for the community. Written at an accessible level the book is suitable for both experts and non-experts alike.

Advances in Heat Transfer fills the information gap between regularly scheduled journals and university-level textbooks by providing in-depth review articles over a broader scope than in traditional journals or texts. The articles, which serve as a broad review for experts in the field are also of great interest to non-specialists who need to keep up-to-date with the results of the latest research. This serial is essential reading for all mechanical, chemical, and industrial engineers working in the field of heat transfer, or in graduate schools or industry.

Compiles the expert opinions of leaders in the industry Fills the information gap between regularly scheduled journals and university-level textbooks by providing in-depth review articles over a broader scope than in traditional journals or texts Essential reading for all mechanical, chemical, and industrial engineers working in the field of heat transfer, or in graduate schools or industry

This monograph focusing on gas flows addresses mostly theoretical issues and develops semi-analytical models as well as numerical methods for stimulating micro flows. It is appropriate for researchers in fluid mechanics interested in this new flow field as well as for electrical or mechanical engineers or physicists who need to incorporate flow modeling into their work.

Analytical Heat and Fluid Flow in Microchannels and Microsystems

Proceedings of the 5th International and 41st National Conference on FMFP 2014

Systems and Applications

Slow Viscous Flows: Qualitative Features And Quantitative Analysis Using Complex Eigenfunction Expansions (With Cd-rom)

Advances in Heat Transfer

Currently, the use of computational fluid dynamics (CFD) solutions is considered as the state-of-the-art in the modeling of unsteady nonlinear flow physics and offers an early and improved understanding of air vehicle aerodynamics and stability and control characteristics. This Special Issue covers recent computational efforts on simulation of aerospace vehicles including fighter aircraft, rotorcraft, propeller driven vehicles, unmanned vehicle, projectiles, and air drop configurations. The complex flow physics of these configurations pose significant challenges in CFD modeling. Some of these challenges include prediction of vortical flows and shock waves, rapid maneuvering aircraft with fast moving control surfaces, and interactions between propellers and wing, fluid and structure, boundary layer and shock waves. Additional topic of interest in this Special Issue is the use of CFD tools in aircraft design and flight mechanics. The problem with these applications is the computational cost involved, particularly if this is viewed as a brute-force calculation of vehicle’s aerodynamics through its flight envelope. To make progress in routinely using of CFD in aircraft design, methods based on sampling, model updating and system identification should be considered.

This book addresses Lab-on-a-Chip devices. It focuses on microfluidic technologies that have emerged in the past decade. Coverage presents a comprehensive listing of the most promising microfluidic technologies in the Lab-on-a-Chip field. It also details technologies that can be viewed as toolboxes needed to set up complex Lab-on-a-Chip systems.

This unique book provides a unified and systematic account of internal, external and unsteady slow viscous flows, including the latest advances of the last decade, some of which are due to the author. The book shows how the method of eigenfunctions, in conjunction with least squares, can be used to solve problems of low Reynolds number flows, including three-dimensional internal and unsteady flows, which until recently were considered intractable. Although the methods used are quantitative, much stress is laid on understanding the qualitative nature of these intriguing flows. A secondary purpose of the book is to explain how the complex eigenfunction method can be used to solve problems in science and engineering. Although primarily aimed at graduate students, academics and research engineers in the areas of fluid mechanics and applied mathematics, care has been taken, through the use of numerous diagrams and much discussion, to explain to the non-specialist the qualitative features of these complex flows./a

Subject area has witnessed explosive growth during the last decade and the technology is progressing at an astronomical rate. Previous edition was first to focus exclusively on flow physics within microdevices. It sold over 900 copies in North America since 11/01. New edition is 40 percent longer, with four new chapters on recent topics including Nanofluidics.

System Modeling and Optimization

Fundamental Concepts

Selected Contributions from the 8th SIMAI Conference : Baia Samuele (Regusa), Italy, 22–26 May 2006

Non-Newtonian Fluid Mechanics and Complex Flows

Microfluidics Based Microsystems

Advances in Sensors: Reviews, Vol. 6

Nanotechnology, especially microfabrication, has been affecting every facet of traditional scientific disciplines. The first book on the application of microfluidic reactors in nanotechnology, Microfluidic Devices in Nanotechnology provides the fundamental aspects and potential applications of microfluidic devices, the physics of microfluids, specific methods of chemical synthesis of nanomaterials, and more. As the first book to discuss the unique properties and capabilities of these nanomaterials in the miniaturization of devices, this text serves as a one-stop resource for nanoscientists interested in microdevices.

To provide an interdisciplinary readership with the necessary toolkit to work with micro- and nanofluidics, this book provides basic theory, fundamentals of microfabrication, advanced fabrication methods, device characterization methods and detailed examples of applications of nanofluidics devices and systems. Case studies describing fabrication of complex micro- and nanoscale systems help the reader gain a practical understanding of developing and fabricating such systems. The resulting work covers the fundamentals, processes and applied challenges of functional engineered nanofluidic systems for a variety of different applications, including discussions of lab-on-chip, bio-related applications and emerging technologies for energy and environmental engineering. The fundamentals of micro- and nanofluidic systems and micro- and nanofabrication techniques provide readers from a variety of academic backgrounds with the understanding required to develop new systems and applications. Case studies introduce and illustrate state-of-the-art applications across areas, including lab-on-chip, energy and bio-based applications. Prakash and Yeom provide readers with an essential toolkit to take micro- and nanofluidic applications out of the research lab and into commercial and laboratory applications.

The book serves as a core text for graduate courses in advanced fluid mechanics and applied science. It consists of two parts. The first provides an introduction and general theory of fully developed turbulence, where treatment of turbulence is based on the linear functional equation derived by E. Hopf governing the characteristic functional that determines the statistical properties of a turbulent flow. In this section, Professor Kollmann explains how the theory is built on divergence free Schauder bases for the phase space of the turbulent flow and the space of argument vector fields for the characteristic functional. Subsequent chapters are devoted to mapping methods, homogeneous turbulence based upon the hypotheses of Kolmogorov and Onsager, intermittency, structural features of turbulent shear flows and their recognition.

Plants and plant-derived compounds and drugs are becoming more and more popular with increasing numbers of scientists researching plant analysis. The quality control of herbal drugs is also becoming essential to avoid severe health problems, and in the future many more new drugs will be developed from plant sources. This three-volume Handbook, featuring 47 detailed review articles, is unique as it deals with chemical and biological methodologies for plant analysis. It presents the most important and most accurate methods which are available for plant analysis. This comprehensive work is divided into six sections as follows: Sample preparation and identification – discussing plant selection and collection, followed by extraction and sample preparation methodologies. Extraction and sample preparation methodologies Instrumentation for chemical analysis - several instrumentations for chemical plant analysis are presented with an emphasis on hyphenated techniques, e.g. the coupling between HPLC and mass spectrometry, and HPLC with NMR. Strategies for selective classes of compounds – coverage of the most interesting classes of compounds such as polysaccharides, saponins, cardiotonic glycosides, alkaloids, terpenoids, lipids, volatile compounds and polyphenols (flavonoids, xanthenes, coumarins, naphthoquinones, anthraquinones, proanthocyanidins, etc.). Biological Analysis - includes phenotyping, DNA barcoding techniques, transcriptome analysis, microarray, metabolomics and proteomics. Drugs from Plants – covers the screening of plant extracts and strategies for the quick discovery of novel bioactive natural products. Safety assessment of herbal drugs is highly dependent on outstanding chromatographic and spectroscopic methods which are also featured here. This Handbook introduces to scientists involved in plant studies the current knowledge of methodologies in various fields of chemically- and biochemically-related topics in plant research. The content from this Handbook will publish online within the Encyclopedia of Analytical Chemistry via Wiley Online Library: <http://www.wileyonlinelibrary.com/ref/eac> <http://www.wileyonlinelibrary.com/ref/eac/a> Benefit from the introductory offer, valid until 30 November 2014! Introductory price: £ 425.00 / \$695.00 / € 550.00 List price thereafter: £ 495.00 / \$795.00 / € 640.00

Theory and Analysis

Nanofluidics

Microfluidic Technologies for Miniaturized Analysis Systems

Porous Silicon: From Formation to Application: Biomedical and Sensor Applications, Volume Two

Incompressible Flow

A Modern Course in Transport Phenomena

This volume contains an archival record of the NATO Advanced Study Institute on Microfluidics Based Microsystems – Fundamentals and Applications held in Çeşme-Izmir, Turkey, August 23–September 4, 2009. ASIs are intended to be high-level teaching activity in scientific and technical areas of current concern. In this volume, the reader may find interesting chapters and various microsystems fundamentals and applications. As the world becomes increasingly concerned with terrorism, early - spot detection of terrorist’s weapons, particularly bio-weapons agents such as bacteria and viruses are extremely important. NATO Public Diplomacy division, Science for Peace and Security section support research, Advanced Study Institutes and workshops related to security. Keeping this policy of NATO in mind, we made such a proposal on Microsystems for security. We are very happy that leading experts agreed to come and lecture in this important NATO ASI. We will see many examples that will show us Microfluidics usefulness for rapid diagnostics following a bioterrorism attack. For the applications in national security and anti-terrorism, microfluidic system technology must meet the challenges. To develop microsystems for security and to provide a comprehensive state-of-the-art assessment of the existing research and applications by treating the subject in considerable depth through lectures from eminent professionals in the field, through discussions and panel sessions are very beneficial for young scientists in the field.

Applications in Inverse Design of Microfluidics

Chemistry, Physics, and Life Science Principles

Microfluidics for Pharmaceutical Applications

Microflows and Nanoflows