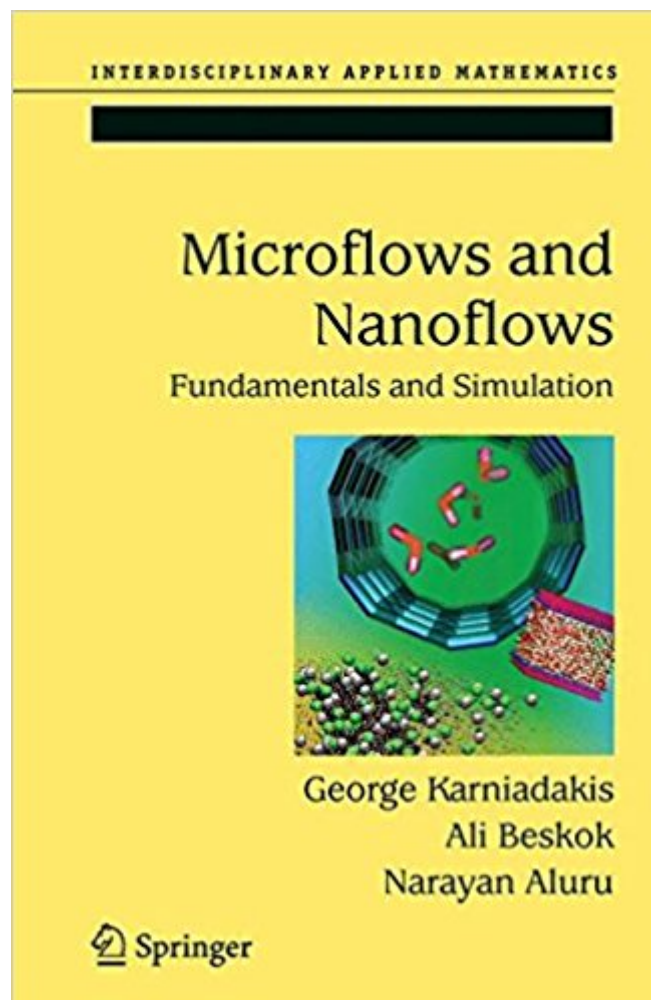




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# Microflows And Nanoflows: Fundamentals And Simulation (Interdisciplinary Applied Mathematics)



## Synopsis

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.

## Book Information

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## Customer Reviews

Reviews for original "Microflows and Nanoflows": "For those who want to compute flows at the micro scale, this monograph is a must. It describes the state of the art and helps by providing coefficients, such as [are] needed in situations of slip. Those who wonder what new fluid dynamics there is in the microworld are served by the overview of theory and treasures of numerical methods."

—European Journal of Mechanics B/Fluids "It is a well-written book which should prove beneficial to the researchers in the field" Zentralblatt fur Mathematik From the reviews:

"Microflows and nanoflows will become an important reference for any researcher interested in the fundamental science and simulation techniques for flow in microchannels and nanopores. ... The new additions in the current book essentially render it the most fundamental book in the field of microfluidics and nanofluidics. I strongly recommend this book as a fundamental reference for the multiscale simulation researchers and for the more fundamental reference theorists in the area of microfluidics and the new field of nanofluidics." (Hsueh-Chia Chang, Mathematical Reviews,

Issue 2006 c) "The monograph under review presents a systematical presentation of all questions connected with fundamentals and simulation of microflows and nanoflows. | The reviewed monograph is the first systematic fundamental presentation of the subject. It is suitable for graduate students and researches in fluid mechanics, physics and in electrical, mechanical and chemical engineering." (Peter A. Velmisov, Zentralblatt MATH, Vol. 1115 (17), 2007)

In the last few years there has been significant progress in the development of microfluidics and nanofluidics at the application as well as at the fundamental and simulation levels. This book provides a comprehensive summary of these changes describing fluid flow in micro and nano configurations. Where as in their previous book entitled *Microflows: Fundamentals and Simulation* the authors covered scales from one hundred nanometers to microns (and beyond), in this new book they discuss length scales from angstroms to microns (and beyond). While still maintaining the emphasis on fundamental concepts with a mix of semianalytical, experimental, and numerical results, this book outlines their relevance to modeling and analyzing functional devices. The text has been divided into three main subject categories: gas flows; liquid flows; and simulation techniques. The majority of the completely new developments in this book are in liquid flows and simulation techniques chapters with modified information throughout the rest of the book. This book can be used in a two-semester graduate course. Also, selected chapters can be used for a short course or an undergraduate-level course. The book is suitable for graduate students and researchers in fluid mechanics, physics, and in electrical, mechanical and chemical engineering. Review of earlier volume on *Microflows* from the *European Journal of Mechanics B/Fluids*, 2002: "For those who want to compute flows at the micro scale, this monograph is a must. It describes the state of the art and helps by providing the coefficients, such as needed in situations of slip. Those who wonder what new fluid dynamics there is in the microworld are served by the overview of theory and treasures of numerical methods."

I was fortunate enough to be given a chance to read the manuscript of this book about a year before it was published. I was looking for a source of general information on fluid issues in MEMS in order to acquaint myself with the subject. Even though many research papers are out there, the new reader to the field needs to be given a solid starting point. Being a well-written research monograph, this is that solid starting point for those who have a grasp of traditional fluid mechanics and want to enhance that understanding for research into MEMS devices and flows encountered at micron scale and below. Now that the book is printed, I used it as the main source of reading for an Indep. Study

course for a graduate student who started his PhD studies recently. The book also provides a wealth of references that will assist the reader to get a deeper understanding of the specific subject.

I believe this is an excellent reference for anyone interested in the field of microfluidics and nanofluidics. When I got the first edition, I was always thinking that the addition of a few chapters on nanoscale fluid flows would make this book a comprehensive monograph for people who have background in conventional fluid mechanics and want to understand the micron and submicron fluid flows phenomena. The authors have done this in the new edition "current edition". It is a well-organized book that makes it easy for reader, especially for graduate students who want to start their research in MEMS and NEMS and for professors who are looking for a reference for their course. The book covers all aspects of micro and nanoflows in terms of their characteristics, scaling effects, and methodologies and approaches that can be used for modified continuum and molecular simulations.

This is an excellent book and I recommend this to any one interested in microfluidics, MEMS or nanotechnology. To my knowledge, this is the first book on microfluidics. The chapters on gas flows, electrokinetically driven liquid flows and on numerical methods for continuum and atomistic simulation are very interesting.

The Book "Microflows and Nanoflows: Fundamentals and Simulation " is very helpful to review the fundamental of flow due to electrokinetics. It was shipped very quickly... I recommend to buy this book if you really need to review the topics of electrokinetics. Thanks.

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