



# Microfluidics and Nanofluidics: Theory and Selected Applications

By Clement Kleinstreuer

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Clement Kleinstreuer

Fluidics originated as the description of pneumatic and hydraulic control systems, where fluids were employed (instead of electric currents) for signal transfer and processing. *Microfluidics and Nanofluidics: Theory and Selected Applications* offers an accessible, broad-based coverage of the basics through advanced applications of microfluidics and nanofluidics. It is essential reading for upper-level undergraduates and graduate students in engineering and professionals in industry.

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### Editorial Review

From the Back Cover

#### **A one-stop resource for understanding all aspects of microfluidics and nanofluidics**

An increasingly influential topic in nanoscience and technology, fluidics is often necessarily employed in handling fluid-particle flow, material processing, and signal transferring in devices ranging from the macro-scale to the nano-scale. *Microfluidics and Nanofluidics* reviews key concepts in fluid mechanics and heat transfer, microfluidics, nanofluidics, and applicable math modeling and computer simulation.

With attention to the fundamentals as well as advanced applications of fluidics, this book imparts a solid knowledge base and develops skills for future problem-solving and system analysis. Fluidics expert and author Clement Kleinstreuer offers a problem/solution format that addresses system sketches, assumptions and postulates, as well as concepts and approaches before launching into analytical solutions and their extensions. Engineers, physicists and mathematicians will be comfortable with the author's split approach to introducing new material, explaining concepts, presenting flow visualizations, and outlining problem-solving techniques.

Designed to help advanced undergraduate and first-year graduate students solve fluidics problems independently, provide physical insight, and suggest system design improvements, *Microfluidics and Nanofluidics* includes:

- Eight comprehensive chapters on classical fluidics theory with applications in macrofluidics, microfluidics theory, applications in microfluidics, nanofluidics theory, applications in nanofluidics, modeling and simulation aspects, and computational case studies
- Step-by-step example problems and homework assignments for each chapter
- Solutions manual available to qualified instructors
- Exposure to the firsthand research and insights of a well-known author who has published extensively on advanced mechanical and biomedical engineering topics

This is a vital resource for upper-level engineering students who want to expand their potential career opportunities and familiarize themselves with an increasingly important field.

About the Author

**Clement Kleinstreuer, PhD**, is a professor of mechanical and biomedical engineering at North Carolina State University. His current research pertains to computational fluid-particle dynamics with applications of micro/nanofluidics to medical device development.

### Users Review

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**Gonzalo Barnes:**

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