



# The Lattice Boltzmann Method: Principles and Practice (Graduate Texts in Physics)

*By Timm Krüger, Halim Kusumaatmaja, Alexandr Kuzmin, Orest Shardt, Goncalo Silva, Erlend Magnus Viggen*

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This book is an introduction to the theory, practice, and implementation of the Lattice Boltzmann (LB) method, a powerful computational fluid dynamics method that is steadily gaining attention due to its simplicity, scalability, extensibility, and simple handling of complex geometries. The book contains chapters on the method's background, fundamental theory, advanced extensions, and implementation.

To aid beginners, the most essential paragraphs in each chapter are highlighted, and the introductory chapters on various LB topics are front-loaded with special "in a nutshell" sections that condense the chapter's most important practical results. Together, these sections can be used to quickly get up and running with the method. Exercises are integrated throughout the text, and frequently asked questions about the method are dealt with in a special section at the beginning. In the book itself and through its web page, readers can find example codes showing how the LB method can be implemented efficiently on a variety of hardware platforms, including multi-core processors, clusters, and graphics processing units. Students and scientists learning and using the LB method will appreciate the wealth of clearly presented and structured information in this volume.

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## Editorial Review

### Review

“The aim of this book is to give a thorough description of the field and to provide researchers and graduate students with powerful tools so that they can immediately apply their knowledge to practical applications. ... readers can find example codes showing how the lattice Boltzmann method can be implemented efficiently on a variety of hardware platforms such as clusters, multi-core processors, and graphics processing units. The rich information included in this volume is clearly presented and well structured.” (Teodora-Liliana R?dulescu, zbMATH 1362.76007, 2017)

### From the Back Cover

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**Alexandr Kuzmin** is a Thermal/CFD Software Engineer at Maya Heat Transfer Technologies. He holds a PhD in CFD from the University of Calgary (Mechanical Engineering Department). He has a broad experience in computational geometry, heat and mass transfer, and numerical methods applied to industrial and research problems.

**Orest Shardt** is a postdoctoral research fellow in Mechanical and Aerospace Engineering at Princeton University. He graduated from the University of Alberta in 2014 with a PhD in chemical engineering. His main research interests are high performance computing and interfacial and electrokinetic phenomena in multiphase flows.

**Goncalo Silva** is a postdoctoral researcher in Mechanical Engineering at IDMEC/IST, University of Lisbon, from where he graduated in 2013 with a PhD in Mechanical Engineering. Between 2013 and 2016, he developed his postdoctoral research at IRSTEA, Antony, France. His main research interests are in the field of microfluidics and flows in porous media.

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