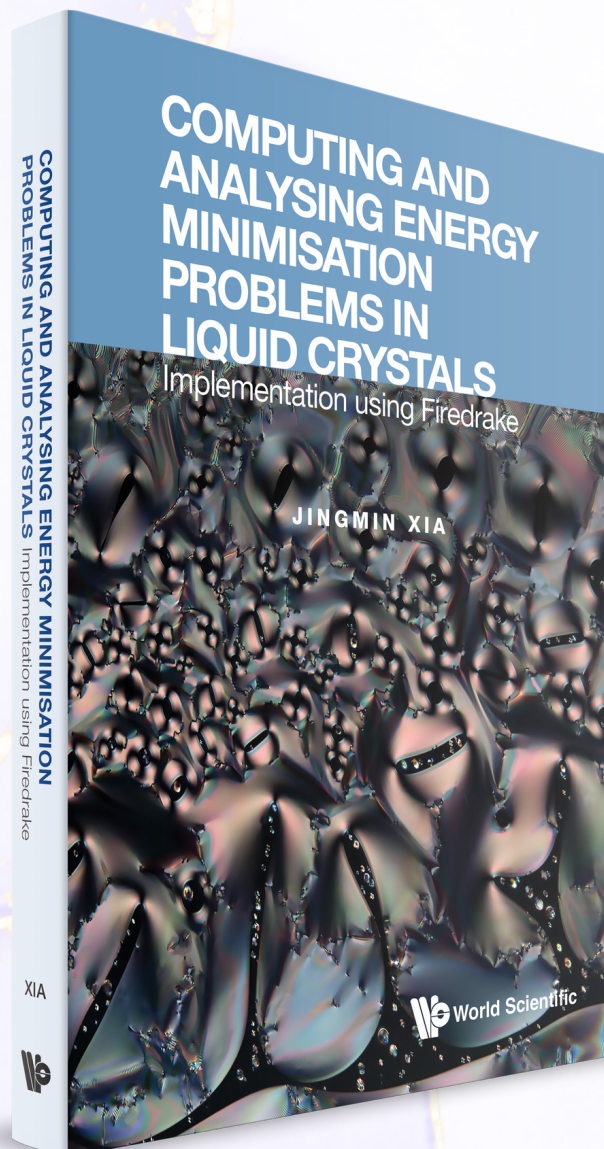


COMPUTING AND ANALYSING ENERGY MINIMISATION PROBLEMS IN LIQUID CRYSTALS

Implementation using Firedrake

Jingmin Xia

National University of Defense Technology, China



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About the Book

How does one numerically analyse different phases of liquid crystals? With the help of some open-source libraries, what can we do in exploiting the mathematical models of liquid crystals and numerical aspects of their typical defects?

There are many excellent books on liquid crystals, but none on their numerics to the knowledge of the author. This book presents some of the latest work on numerical investigations of liquid crystals, addressing some mathematical modelling and numerical problems. This book consists of three major parts, each of which focuses on different problems for different phases of liquid crystals: nematics and cholesterics, ferronematics and smectics. The associated topics include robust solvers for cholesterics, multiple solutions for ferronematics, and mathematical modelling theory for smectics, etc.

This interdisciplinary book can be helpful in utilising the open-source libraries Firedrake (for solving problems using finite element methods) and Defcon (for computing multiple solutions) to solve general energy minimisation problems.

Readership

Advanced undergraduate and graduate students interested in numerical modelling of liquid crystals; researchers in the fields of mathematical theories and numerical aspects in liquid crystals.

About the Author

Jingmin Xia received her PhD from the Mathematical Institute at the University of Oxford. She has been working on applied and computational mathematics, particularly solving energy minimisation problems arising in liquid crystals, solids and ocean modelling. She has received grants from National Natural Science Foundation of China, among others. Currently, she is a lecturer in the National University of Defense Technology.

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