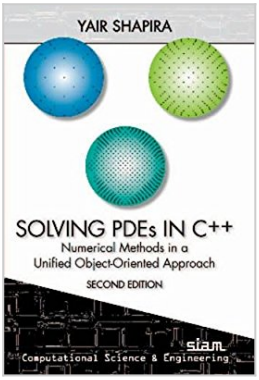

Solving PDEs in C++: Numerical Methods in a Unified Object-Oriented Approach, Second Edition (Computational Science and Engineering)

By Yair Shapira

Solving PDEs in C++: Numerical Methods in a Unified Object-Oriented Approach, Second Edition (Computational Science and Engineering) By Yair Shapira

In this much-expanded second edition, author Yair Shapira presents new applications and a substantial extension of the original object-oriented framework to make this popular and comprehensive book even easier to understand and use. It not only introduces the C and C++ programming languages, but also shows how to use them in the numerical solution of partial differential equations (PDEs).

New material in this edition includes new chapters on 3-D nonlinear applications and image processing applications; new sections on cryptography applications; and even more new sections, many including additional algorithms.

The book leads readers through the entire solution process, from the original PDE, through the discretization stage, to the numerical solution of the resulting algebraic system. The high level of abstraction available in C++ is particularly useful in the implementation of complex mathematical objects, such as unstructured mesh, sparse matrix, and multigrid hierarchy, often used in numerical modeling. The well-debugged and tested code segments implement the numerical methods efficiently and transparently in a unified object-oriented approach.

Audience: The book is written for researchers, engineers, and advanced students who wish to increase their familiarity with numerical methods and to implement them using modern programming tools. *Solving PDEs in C++, Second Edition* can be used as a textbook in courses in C++ with applications, C++ in engineering, numerical analysis, and numerical PDEs at the advanced undergraduate and graduate levels. Because it is self-contained, the book is also suitable for self-study by researchers and students in applied and computational

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Editorial Review

Review
There are dozens of excellent books on C++ and object-oriented programming, but very few of them put the language into the perspective of scientific computing. The introductory part of the present book acts as a language introduction, while the main contents focus on how C++ can be used to implement numerical algorithms. I would say that this is a long-awaited type of textbook in the scientific computing community. -- Hans Petter Langtangen, Professor, Simula Research Laboratory and University of Oslo, Norway.

About the Author
Yair Shapira is engaged in research in the Computer Science Department, Technion-Israel Institute of Technology, Haifa, Israel. His main research interests are multigrid, preconditioning, and numerical methods. He is author of the books *Matrix-Based Multigrid: Theory and Applications, Second Edition* (Springer, 2008) and *Mathematical Objects in C++: Computational Tools in a Unified Object-Oriented Approach* (CRC, 2009).

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