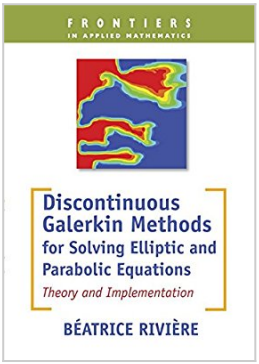

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics)

By Béatrice M. Rivière

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics)
By Béatrice M. Rivière

Discontinuous Galerkin (DG) methods for solving partial differential equations, developed in the late 1990s, have become popular among computational scientists. This book covers both theory and computation as it focuses on three primal DG methods--the symmetric interior penalty Galerkin, incomplete interior penalty Galerkin, and nonsymmetric interior penalty Galerkin which are variations of interior penalty methods. The author provides the basic tools for analysis and discusses coding issues, including data structure, construction of local matrices, and assembling of the global matrix. Computational examples and applications to important engineering problems are also included.

Discontinuous Galerkin Methods for Solving Elliptic and Parabolic Equations: Theory and Implementation is divided into three parts: Part I focuses on the application of DG methods to second order elliptic problems in one dimension and in higher dimensions. Part II presents the time-dependent parabolic problems without and with convection. Part III contains applications of DG methods to solid mechanics (linear elasticity), fluid dynamics (Stokes and Navier Stokes), and porous media flow (two-phase and miscible displacement).

Appendices contain proofs and MATLAB® code for one-dimensional problems for elliptic equations and routines written in C that correspond to algorithms for the implementation of DG methods in two or three dimensions.

Audience: This book is intended for numerical analysts, computational and applied mathematicians interested in numerical methods for partial differential equations or who study the applications discussed in the book, and engineers who work in fluid dynamics and solid mechanics and want to use DG methods for their numerical results. The book is appropriate for graduate courses in finite

element methods, numerical methods for partial differential equations, numerical analysis, and scientific computing. Chapter 1 is suitable for a senior undergraduate class in scientific computing.

Contents: List of Figures; List of Tables; List of Algorithms; Preface; Part I: Elliptic Problems; Chapter 1: One-dimensional problem; Chapter 2: Higher dimensional problem; Part II: Parabolic Problems; Chaper 3: Purely parabolic problems; Chapter 4: Parabolic problems with convection; Part III: Applications; Chapter 5: Linear elasticity; Chapter 6: Stokes flow; Chapter 7: Navier-Stokes flow; Chapter 8: Flow in porous media; Appendix A: Quadrature rules; Appendix B: DG codes; Appendix C: An approximation result; Bibliography; Index.

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics)

By Béatrice M. Rivière

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière

Discontinuous Galerkin (DG) methods for solving partial differential equations, developed in the late 1990s, have become popular among computational scientists. This book covers both theory and computation as it focuses on three primal DG methods--the symmetric interior penalty Galerkin, incomplete interior penalty Galerkin, and nonsymmetric interior penalty Galerkin which are variations of interior penalty methods. The author provides the basic tools for analysis and discusses coding issues, including data structure, construction of local matrices, and assembling of the global matrix. Computational examples and applications to important engineering problems are also included.

Discontinuous Galerkin Methods for Solving Elliptic and Parabolic Equations: Theory and Implementation is divided into three parts: Part I focuses on the application of DG methods to second order elliptic problems in one dimension and in higher dimensions. Part II presents the time-dependent parabolic problems without and with convection. Part III contains applications of DG methods to solid mechanics (linear elasticity), fluid dynamics (Stokes and Navier Stokes), and porous media flow (two-phase and miscible displacement).

Appendices contain proofs and MATLAB® code for one-dimensional problems for elliptic equations and routines written in C that correspond to algorithms for the implementation of DG methods in two or three dimensions.

Audience: This book is intended for numerical analysts, computational and applied mathematicians interested in numerical methods for partial differential equations or who study the applications discussed in the book, and engineers who work in fluid dynamics and solid mechanics and want to use DG methods for their numerical results. The book is appropriate for graduate courses in finite element methods, numerical methods for partial differential equations, numerical analysis, and scientific computing. Chapter 1 is suitable for a senior undergraduate class in scientific computing.

Contents: List of Figures; List of Tables; List of Algorithms; Preface; Part I: Elliptic Problems; Chapter 1: One-dimensional problem; Chapter 2: Higher dimensional problem; Part II: Parabolic Problems; Chaper 3: Purely parabolic problems; Chapter 4: Parabolic problems with convection; Part III: Applications; Chapter 5: Linear elasticity; Chapter 6: Stokes flow; Chapter 7: Navier-Stokes flow; Chapter 8: Flow in porous media; Appendix A: Quadrature rules; Appendix B: DG codes; Appendix C: An approximation result; Bibliography; Index.

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière Bibliography

- Sales Rank: #1742694 in Books
- Published on: 2008-07-14
- Original language: English
- Number of items: 1
- Dimensions: 9.72" h x .47" w x 6.85" l, .87 pounds
- Binding: Paperback
- 212 pages

Editorial Review

About the Author
Béatrice Rivière is an Associate Professor in the Department of Computational and Applied Mathematics at Rice University. Her research interests include the development of high-order numerical methods for solving partial differential equations arising from complex flow and transport problems as well as the modeling of inflammation and wound healing in biomedical applications.

Users Review

From reader reviews:

Lenore Ryan:

What do you concentrate on book? It is just for students since they are still students or it for all people in the world, what best subject for that? Merely you can be answered for that problem above. Every person has diverse personality and hobby for each other. Don't to be obligated someone or something that they don't would like do that. You must know how great and also important the book Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics). All type of book are you able to see on many resources. You can look for the internet methods or other social media.

Robert Beck:

Beside this specific Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) in your phone, it could possibly give you a way to get nearer to the new knowledge or facts. The information and the knowledge you might got here is fresh from your oven so don't be worry if you feel like an old people live in narrow town. It is good thing to have Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) because this book offers for your requirements readable information. Do you at times have book but you seldom get what it's interesting features of. Oh come on, that won't happen if you have this within your hand. The Enjoyable arrangement here cannot be questionable, such as treasuring beautiful island. Techniques you still want to miss that? Find this book and also read it from today!

Joshua Matthews:

Don't be worry should you be afraid that this book will filled the space in your house, you may have it in e-book approach, more simple and reachable. This specific Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) can give you a lot of pals because by you checking out this one book you have issue that they don't and make you actually more like an interesting person. That book can be one of one step for you to get success. This publication offer you information that possibly your friend doesn't learn, by knowing more than various other make you to be great folks. So , why hesitate? Let us have Discontinuous Galerkin Methods For Solving

Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics).

Jean McCallum:

Do you like reading a publication? Confuse to looking for your best book? Or your book had been rare? Why so many question for the book? But just about any people feel that they enjoy to get reading. Some people likes studying, not only science book but additionally novel and Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) or others sources were given understanding for you. After you know how the great a book, you feel would like to read more and more. Science e-book was created for teacher or even students especially. Those textbooks are helping them to include their knowledge. In additional case, beside science guide, any other book likes Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) to make your spare time far more colorful. Many types of book like here.

Read Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière for online ebook

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière books to read online.

Online Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière ebook PDF download

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière Doc

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière Mobipocket

Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière EPub

7H09XI5P6E3: Discontinuous Galerkin Methods For Solving Elliptic And parabolic Equations: Theory and Implementation (Frontiers in Applied Mathematics) By Béatrice M. Rivière