Matrix-Based Multigrid [Theory and Applications /

Shapira, Yair

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Monografía

Multigrid methods are often used for solving partial differential equations. This book introduces and analyzes the multigrid approach. The approach used here applies to both test problems on rectangular grids and to more realistic applications with complicated grids and domains. Key Features of this Second Edition: - Discusses multigrid methods from the domain decomposition viewpoint, thus making the material accessible to beginning undergraduate/graduate students - Uses the semialgebraic multigrid approach to handle complex topics (such as the solution of systems of PDEs) - Provides relevant and insightful exercises at the end of each chapter which help reinforce the material - Uses numerous illustrations and examples to motivate the subject matter - Covers important applications in physics, engineering and computer science Matrix-Based Multigrid can serve as a textbook for courses in numerical linear algebra, numerical methods for PDEs, and computational physics at the advanced undergraduate and graduate levels. Since most of the background material is covered, the only prerequisites are elementary linear algebra and calculus. Excerpts from the reviews of the first edition: "This book contains a wealth of information about using multilevel methods to solve partial differential equations (PDEs). . . A common matrix-based framework for developing these methods is used throughout the book. This approach allows methods to be developed for problems under three very different conditions. . . This book will be insightful for practitioners in the field. . . students will enjoy studying this book to see how the many puzzle pieces of the multigrid landscape fit together." (Loyce Adams, SIAM review, Vol. 47(3), 2005) "The discussion very often includes important applications in physics, engineering, and computer science. The style is clear, the details can be understood without any serious prerequisite. The usage of multigrid method for unstructured grids is exhibited by a well commented C++ program. This way the book is suitable for anyone . . . who needs numerical solution of partial differential equations." (Peter Hajnal, Acta Scientiarum Mathematicarum, Vol. 70, 2004)

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