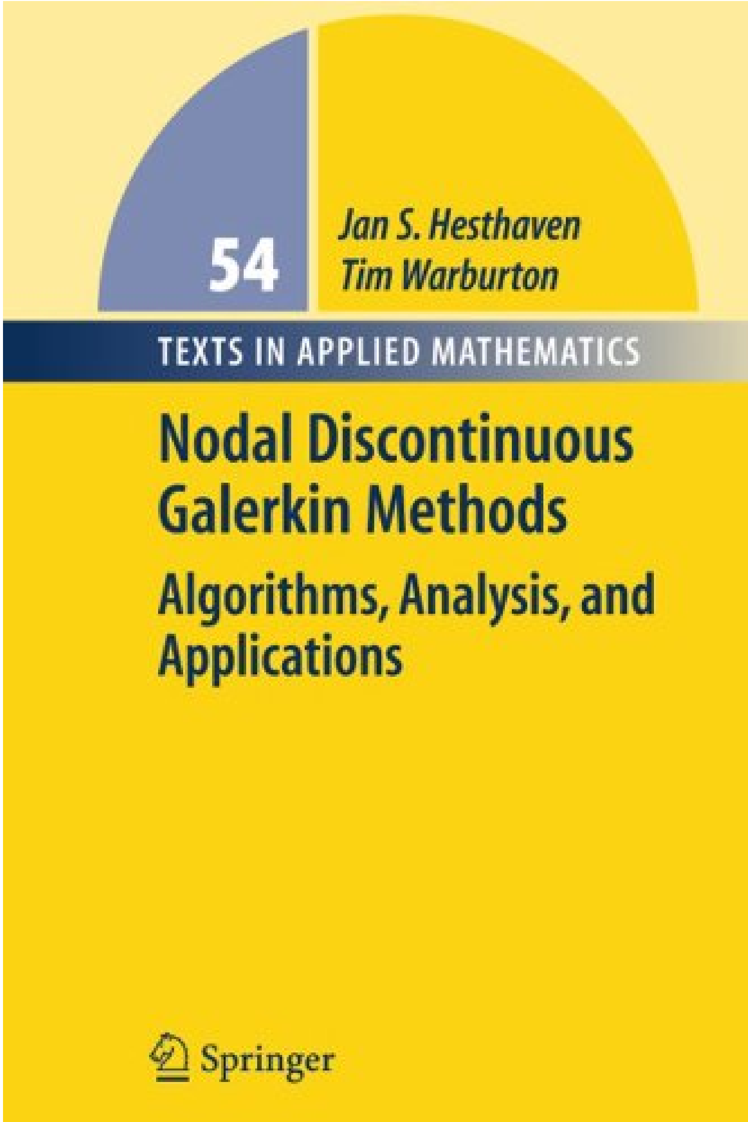
Nodal Discontinuous Galerkin Methods



Par Jan S. Hesthaven

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Description :

Prsentation de l'diteurThe text offers an introduction to the key ideas, basic analysis, and efficient implementation of discontinuous Galerkin finite element methods (DG-FEM) for the solution of partial differential equations. All key theoretical results are either derived or discussed, including an overview of relevant results from approximation theory, convergence theory for numerical PDEs, orthogonal polynomials etc. Through embedded Matlab codes, the algorithms are discussed and implemented for a number of classic systems of PDEs, e.g., Maxwells equations, Euler equations, incompressible Navier-Stokes equations, and Poisson- and Helmholtz equations. These developments are done in detail in one and two dimensions on general unstructured grids with high-order elements and all essential routines for 3D extensions are also included and discussed briefly. The three appendices contain an overview of orthogonal polynomials and associated library routines used throughout, a brief introduction to grid generation, and an overview of the associated software (where to get it, list of variables etc). A variety of exercises are included at the end of most chapters.Prsentation de l'diteurThe text offers an introduction to the key ideas, basic analysis, and efficient implementation of discontinuous Galerkin finite element methods (DG-FEM) for the solution of partial differential equations. All key theoretical results are either derived or discussed, including an overview of relevant results from approximation theory, convergence theory for numerical PDEs, orthogonal polynomials etc. Through embedded Matlab codes, the algorithms are discussed and implemented for a number of classic systems of PDEs, e.g., Maxwells equations, Euler equations, incompressible Navier-Stokes equations, and Poisson- and Helmholtz equations. These developments are done in detail in one and two dimensions on general unstructured grids with high-order elements and all essential routines for 3D extensions are also included and discussed briefly. The three appendices contain an overview of orthogonal polynomials and associated library routines used throughout, a brief introduction to grid generation, and an overview of the associated software (where to get it, list of variables etc). A variety of exercises are included at the end of most chapters.