<<有限元方法的数学理论>>

图书基本信息

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前言

Mathematics is playing an ever more important role in the physical and biological sciences, provoking a blurring of boundaries between scientific disciplines and a resurgence of interest in the modern as well as the clas-sical techniques of applied mathematics. This renewal of interest, both inresearch and teaching, has led to the establishment of the series Texts in Applied Mathematics （TAM）. The development of new courses is a natural consequence of a high level of excitement on the research frontier as newer techniques, such asnumerical and symbolic computer systems, dynamical systems, and chaos, mix with and reinforce the traditional methods of applied mathematics.Thus, the purpose of this textbook series is to meet the current and future needs of these advances and to encourage the teaching of new courses. TAM will publish textbooks suitable for use in advanced undergraduateand beginning graduate courses, and will complement the Applied Mathe-matical Sciences （AMS） series, which will focus on advanced textbooks andresearch-level monographs.

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内容概要

This edition contains four new sections on the following topics: the BDDC domain decomposition preconditioner (Section 7.8), a convergent adaptive algorithm (Section 9.5), interior penalty methods (Section 10.5) and Poincare-Friedrichs inequalities for piecewise Wp1 functions (Section 10.6).We have made improvements throughout the text, many of which were suggested by colleagues, to whom we are grateful. New exercises have been added and the list of references has also been expanded and updated.

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章节摘录

We will take this opportunity to philosophize about some power-ful characteristics of the finite element formalism for generating discreteschemes for approximating the solutions to differential equations. Being based on the variational formulation of boundary value problems, it is quite systematic, handling different boundary conditions with ease ; one simply re-places infinite dimensional spaces with finite dimensional subspaces. What results, as in (0.5.3) , is the same as a finite difference equation, in keeping with the dictum that different numerical methods are usually more similarthan they are distinct. However, we were able to derive very quickly the convergence properties of the finite element method. Finally, the notation for the discrete scheme is quite compact in the finite element for mulation.This could be utilized to make coding the algorithm much more efficient if only the appropriate computer language and compiler were available. Thislatter characteristic of the finite element method is one that has not yet been exploited extensively, but an initial attempt has been made in the sys-tem fec (Bagheri, Scott & Zhang 1992) . (One could also argue that finiteele ment practitioners have already taken advantage of this by developingtheir own "languages" through extensive software libraries of their own, but this applies equally well to the finite-difference practitioners.) .....

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