

<<人工边界方法>>

图书基本信息

书名：<<人工边界方法>>

13位ISBN编号：9787302303909

10位ISBN编号：7302303908

出版时间：2012-12

出版时间：清华大学出版社

作者：韩厚德，巫孝南 著

页数：423

字数：617000

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

## <<人工边界方法>>

### 内容概要

人工边界方法是求解无界区域上偏微分方程（组）数值解的一个重要和有效的方法。人工边界方法的核心问题是在人工边界上如何对已知的问题找出问题的解满足的准确（或者高精度近似）的边界条件。

借助于人工边界方法，我们可将无界区域上的问题简化为有界区域上的问题进行数值计算。

《Artificial Boundary Method(人工边界方法)(精)(英文)》系统地介绍了人工边界方法的计算格式及其理论基础。

《Artificial Boundary Method(人工边界方法)(精)(英文)》可以作为科学与工程计算专业研究生课程的教材，亦可以作为科学与工程计算专业科学技术人员的参考书。

## 书籍目录

- introduction
- references
- chapter 1 global abcs for second order elliptic equations
  - 1.1 exterior problem of second order elliptic equations
  - 1.2 global abcs for the exterior problem of 2-d poisson equation
    - 1.2.1 steklov-poincaré mapping for the exterior problem of laplace equation
    - 1.2.2 the reduced boundary value problem on  $\Omega_i$ .
    - 1.2.3 finite element approximation of the reduced boundary value problem (1.2.30)~(1.2.32)
  - 1.3 global abcs for the exterior problems of 3-d poisson equation
    - 1.3.1 exact and approximate abcs on the spherical artificial boundary  $\Gamma_r$
    - 1.3.2 equivalent and approximate boundary value problems on the bounded computational domain  $\Omega_i$
    - 1.3.3 finite element approximation of the variational problem (1.3.30)
  - 1.4 exterior problem of the modified helmholtz equation
    - 1.4.1 global boundary condition of the exterior problem for the 2-d modified helmholtz equation
    - 1.4.2 the reduced boundary value problem on the computational domain  $\Omega_i$
    - 1.4.3 finite element approximation of the reduced boundary value problem
    - 1.4.4 global boundary condition of the exterior problem for the 3-d modified helmholtz equation
  - 1.5 global abcs for the exterior problems of the helmholtz equation
    - 1.5.1 dirichlet to sommerfeld mapping of the exterior problem of the 2-d helmholtz equation
    - 1.5.2 dirichlet to sommerfeld mapping of the exterior problem of the 3-d helmholtz equation
- references
- chapter 2 global abcs for the navier system and stokes system
  - 2.1 navier system and stokes system
  - 2.2 the exterior problem of the 2-d navier system
    - 2.2.1 the global boundary condition on the artificial boundary  $\Gamma_r$
    - 2.2.2 the reduced problem on the bounded domain
    - 2.2.3 the finite element approximation for the reduced problem (2.2.59)
  - 2.3 exterior problem of the 2-d stokes system

## &lt;&lt;人工边界方法&gt;&gt;

- 2.3.1 highly accurate approximate artificial boundary condition
- 2.3.2 finite element approximation on the computational domain for the reduced problem
- 2.4 vector fields on the spherical surface.
- 2.5 global abcs for the exterior problem of 3-d navier system.
  - 2.5.1 highly accurate approximate abcs
  - 2.5.2 finite element approximation of the variational problem on the bounded computational domain 100 references
- chapter 3 global abcs for heat and schr.dinger equations
  - 3.1 heat equations on unbounded domains
    - 3.2 1-d heat equations on unbounded domains
      - 3.2.1 exact boundary conditions on the artificial boundary
      - 3.2.2 finite difference approximation for the reduced problem (3.2.7)~(3.2.10)
      - 3.2.3 stability analysis of scheme (3.2.29)~(3.2.33)
    - 3.3 global boundary conditions for exterior problems of 2-d heat equations
      - 3.3.1 exact and approximate conditions on the artificial boundary  $r$ .
      - 3.3.2 finite difference approximation of the reduced problem (3.3.37)~(3.3.40)
    - 3.4 global boundary conditions for exterior problems of 3-d heat equations
      - 3.4.1 exact and approximate conditions on the artificial boundary  $r$ .
      - 3.4.2 stability analysis for the reduced initial boundary value problem
      - 3.4.3 the finite element approximation for the reduced initial boundary value problem (3.4.38)~(3.4.41)
    - 3.5 schr.dinger equation on unbounded domains
      - 3.6 1-d schr.dinger equation on unbounded domains.
        - 3.6.1 the reduced initial value problem and its finite difference approximation
        - 3.6.2 stability and convergence analysis of scheme (3.6.19)~(3.6.22)
    - 3.7 the global boundary condition for the exterior problem of the 2-d linear schr.dinger equation
      - 3.7.1 exact and approximate boundary conditions on the artificial boundary  $r$
      - 3.7.2 stability analysis of the reduced approximate initial boundary value problem
    - 3.8 the global boundary condition for the exterior problem of the 3-d linear schr.dinger equation
      - 3.8.1 exact and approximate boundary conditions on the artificial boundary  $r$

## &lt;&lt;人工边界方法&gt;&gt;

- 3.8.2 stability analysis of the reduced approximate initial boundary value problem
- references
- chapter 4 abcs for wave equation, klein-gordon equation, and linear kdv equations
- 4.1 1-d wave equation
  - 4.1.1 transparent boundary conditions on the artificial boundaries  $\Gamma_1$  and  $\Gamma_2$
  - 4.2 2-d wave equation
    - 4.2.1 absorbing boundary conditions
    - 4.2.2 the initial boundary value problem on the bounded computational domain  $\Omega_i$
  - 4.3 3-d wave equation
    - 4.3.1 absorbing boundary condition on the artificial boundary  $\Gamma_r$
    - 4.3.2 the equivalent and approximate initial boundary value problem on the bounded computational domain  $\Omega_i$
  - 4.4 1-d klein-gordon equation
    - 4.4.1 absorbing boundary conditions on the artificial boundary  $\Gamma_1$ ,  $\Gamma_2$  and  $\Gamma_3$
    - 4.4.2 the initial boundary value problem on the bounded computational domain  $\Omega_i$
  - 4.5 2- and 3-d klein-gordon equations.
    - 4.5.1 absorbing boundary conditions on the artificial boundary  $\Gamma_r$  (2-d case)
    - 4.5.2 absorbing boundary conditions on the artificial boundary  $\Gamma_r$  (3-d case)
    - 4.5.3 the initial boundary value problem on the bounded computational domain  $\Omega_i$
  - 4.6 linear kdv equation
    - 4.6.1 absorbing boundary condition on the artificial boundaries  $\Gamma_a$  and  $\Gamma_b$
    - 4.6.2 the equivalent initial boundary value problem on the bounded computational domain
- 4.7 appendix: three integration formulas
- references
- chapter 5 local artificial boundary conditions
- 5.1 local boundary conditions for exterior problems of the 2-d poisson equation
  - 5.1.1 local boundary condition on the artificial boundary  $\Gamma_r$
  - 5.1.2 finite element approximation using the local boundary condition and its error estimate
- 5.2 local boundary conditions for the 3-d poisson equation
  - 5.2.1 the local boundary condition on the artificial boundary  $\Gamma_r$  for problem (i)
  - 5.2.2 local boundary conditions on the artificial boundary  $\Gamma_r$  for problem (ii)

## &lt;&lt;人工边界方法&gt;&gt;

5.3 local abcs for wave equations on unbounded domains

references

chapter 6 discrete artificial boundary conditions

6.1 boundary condition on a polygon boundary for the 2-d poisson equation—the method of lines

6.1.1 discrete boundary conditions on polygonal boundaries

6.1.2 numerical approximation of the exterior problem

(6.1.1)~(6.1.3)

6.2 2-d viscous incompressible flow in a channel—infinite difference method

6.2.1 2-d viscous incompressible flow in a channel

6.2.2 discrete abcs

6.3 numerical simulation of infinite elastic foundation—infinite element method

6.3.1 the steklov-poincarè on an artificial boundary of line segments

6.3.2 numerical approximation for the bilinear form  $b(u, v)$

6.3.3 a direct method for solving the infinite system of algebraic equations (6.3.25)

6.3.4 a fast iteration method for computing the combined stiffness matrix  $kz$ .

6.4 discrete absorbing boundary condition for the 1-d klein-gordon equation—z transform method

6.4.1 z transform

6.4.2 discrete absorbing abc

6.4.3 finite difference approximation for the 1-d klein-gordon equation on the bounded domain. 296 references

chapter 7 implicit artificial boundary conditions

7.1 implicit boundary condition for the exterior problem of the 2-d poisson equation

7.1.1 the single and double layer potential, and their derivative for the 2-d laplace equation

7.1.2 the derivation of the implicit abc for the exterior problem of the 2-d poisson equation

7.1.3 the finite element approximation and error estimate for the variational problem (7.1.37)

7.2 implicit boundary condition for the exterior problem of the 3-d poisson equation

7.3 abc for the exterior problem of the helmholtz equation

7.3.1 the normal derivative on  $\Gamma_a$  for the double layer potential of the helmholtz equation

7.4 implicit abcs for the exterior problems of the navier system.

7.4.1 fundamental solution, stress operator, single and double layer potentials

7.4.2 new forms of  $t(\cdot, x) \cdot \nu(x)$  on  $\Gamma_a$  ( $n = 2$ )

7.4.3 new forms of  $t(\cdot, x) \cdot \nu(x)$  on  $\Gamma_a$  ( $n = 3$ )

## &lt;&lt;人工边界方法&gt;&gt;

- 7.4.4 implicit abc for the exterior problem
- 7.5 implicit abcs for the sound wave equation.
  - 7.5.1 the kirchhoff formula for the 3-d sound wave equation
- references
- chapter 8 nonlinear artificial boundary conditions
  - 8.1 the burgers equation
    - 8.1.1 nonlinear abcs for the burgers equation
    - 8.1.2 the equivalent initial boundary value problem on the bounded computational domain  $\Omega$
  - 8.2 the kardar-parisi-zhang equation
    - 8.2.1 nonlinear abc for the k-p-z equation ( $d = 1$ )
    - 8.2.2 nonlinear abc for the k-p-z equation ( $d = 2$ )
    - 8.2.3 nonlinear abc for the k-p-z equation ( $d = 3$ )
  - 8.3 the cubic nonlinear schrödinger equation.
    - 8.3.1 nonlinear boundary conditions on the artificial boundaries  $\Gamma$  and  $\Gamma_0$
    - 8.3.2 the equivalent initial boundary value problem on the bounded domain  $[-1, 0] \times [0, t]$
  - 8.4 operator splitting method for constructing approximate nonlinear abcs
    - 8.4.1 the local absorbing abc for the linear schrödinger equation
    - 8.4.2 finite difference approximation on the bounded computational domain. 360 references
- chapter 9 applications to problems with singularity
  - 9.1 the modified helmholtz equation with a singularity
    - 9.1.1 abc near singular points
    - 9.1.2 an iteration method based on the abc
  - 9.2 the interface problem with a singularity
    - 9.2.1 a discrete boundary condition on the artificial boundary  $\Gamma$
    - 9.2.2 finite element approximation
  - 9.3 the linear elastic problem with a singularity
    - 9.3.1 discrete boundary condition on the artificial boundary  $\Gamma$
    - 9.3.2 an iteration method based on the abc
  - 9.4 the stokes equations with a singularity
    - 9.4.1 the discrete boundary condition on the artificial boundary  $\Gamma$
    - 9.4.2 singular finite element approximation
- references
- bibliography

<<人工边界方法>>

章节摘录

版权页： 插图：



## <<人工边界方法>>

### 编辑推荐

《人工边界方法(英文)》可以作为科学与工程计算专业研究生课程的教材，亦可以作为科学与工程计算专业科学技术人员的参考书。

<<人工边界方法>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>