

<<流体动力学稳定性>>

图书基本信息

书名：<<流体动力学稳定性>>

13位ISBN编号：9787510040672

10位ISBN编号：7510040671

出版时间：2012-1

出版时间：世界图书出版公司

作者：德拉津

页数：605

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>

<<流体动力学稳定性>>

内容概要

《流体动力学稳定性

第2版》是一部全面流体动力学稳定性的专著。

首先详细介绍了这个领域的三大主题：流体稳定性、热对流、旋转和弯曲流和平行切变流；接着讲述平行切变流的数学理论、大量的线性理论应用、分层理论和不稳定性。

《流体动力学稳定性

第2版》尽可能多地囊括涉及到的试验和数值理论，重点强调用到的物理方法和技巧以及书中得到的结果。

本书的最大特点是包括了大量的习题，这些习题不仅能够很好的掌握书中的内容，而且也是书中一些疑难知识的更具体解答。

目次：导论；热力不稳定性；离心不稳定性；平行切变流；一致渐进逼近；更多有关线性稳定理论；非线性稳定性；附录：广义airy函数。

《流体动力学稳定性 第2版》读者对象：物理、力学专业的研究生、教师和相关的科研人员。

<<流体力学稳定性>>

作者简介

作者：（英国）德拉津（P.G.Drazin）

<<流体动力学稳定性>>

书籍目录

foreword by john miles
 preface
 1 introduction
 1 introduction
 2 mechanisms of instability
 3 fundamental concepts of hydrodynamic stability
 4 kelvin-helmholtz instability
 5 break-up of a liquid jet in air
 problems for chapter 1
 2 thermal instability
 6 introduction
 7 the equations of motion
 the exact equations, 34; the boussinesq equations,35
 8 the stability problem
 the linearized equations, 37; the boundary conditions, 40; normal modes, 42
 9 general stability characteristics
 exchange of stabilities, 44; a variational principle,45
 10 particular stability characteristics
 free-free boundaries, 50; rigid-rigid boundaries,51; free-rigid boundaries, 52
 11 the cells
 12 experimental results
 13 some applications
 problems for chapter 2
 3 centrifugal instability
 14 introduction
 15 instability of an inviscid fluid
 three-dimensional disturbances, 73; axisymmetric disturbances, 77, two-dimensional disturbances, 80
 16 instability of couette flow of an inviscid fluid
 17 the taylor problem
 axisymmetric disturbances, 90; two-dimensional disturbances, 103; three-dimensional disturbances,104; some experimental results, 104
 18 the dean problem
 the dean problem, 108; the taylor-dean problem, 113
 19 the görtler problem
 problems for chapter 3
 4 parallel shear flows
 20 introduction
 the inviscid theory
 21 the governing equations
 22 general criteria for instability
 23 flows with piecewise-linear velocity profiles

<<流体动力学稳定性>>

unbounded vortex sheet, 145; unbounded shear layer, 146; bounded shear layer, 147

24 the initial-value problem

the viscous theory

25 the governing equations

26 the eigenvalue spectrum for small reynolds numbers

a perturbation expansion, 159; sufficient conditions for stability, 161

27 heuristic methods of approximation

the reduced equation and the inviscid approximations, 165; the boundary-layer approximation near a rigid wall, 167; the wkbj approximations, 167; the local turning-point approximations, 171; the truncated equation and tollmien's improved viscous approximations, 175; the viscous

correction to the singular inviscid solution, 177

28 approximations to the eigenvalue relation

symmetrical flows in a channel, 181; flows of the boundary-layer type, 183; the boundary-layer approximation to $\psi_3(z)$, 184; the wkbj approximation to $\psi_3(z)$, 185; the local turning-point approximation to $\psi_3(z)$, 188; tollmien's improved approximation to $\psi_3(z)$, 191

29 the long-wave approximation for unbounded flows

30 numerical methods of solution

expansions in orthogonal functions, 203; finite-difference methods, 206; initial-value methods (shooting), 207

31 stability characteristics of various basic flows

plane couette flow, 212; poiseuille flow in a circular pipe, 216; plane poiseuille flow, 221; combined plane couette and plane poiseuille flow, 223; the blasius boundary-layer profile, 224; the asymptotic suction boundary-layer profile, 227; boundary layers at separation, 229; the falkner-skam profiles, 231; the bickley jet, 233; the hyperbolic-tangent shear layer, 237

32 experimental results

problems for chapter 4

5 uniform asymptotic approximations

33 introduction

plane couette flow

34 the integral representations of the solutions

35 the differential equation method

general velocity profiles

36 a preliminary transformation

37 the inner and outer expansions

the inner expansions, 268; the outer expansions, 271; the central matching problem, 276; composite approximations, 278

38 uniform approximations

the solution of well-balanced type, 280; the solutions of balanced type, 280; the solutions of dominant-recessive type,

<<流体动力学稳定性>>

283

39 a comparison with lin's theory

40 preliminary simplification of the eigenvalue relation

41 the uniform approximation to the eigenvalue relation

a computational form of the first approximation to the eigenvalue relation, 299; results for plane poiseuille flow, 301

42 a comparison with the heuristic approximations to the eigenvalue relation

the local turning-point approximation to $\zeta(z)$, 305; tolimien'simproved approximation to $\zeta(z)$, 306; the uniform approximation to $\zeta(z)$ based on the truncated equation, 308; the uniform approximation to $\zeta(z)$ based on the orr-sommerfeld equation, 309

43 a numerical treatment of the orr-sommerfeld problem using compound matrices

symmetrical flows in a channel, 315; boundary-layer flows, 316

problems for chapter 5

6 additional topics in linear stability theory

44 instability of parallel flow of a stratified fluid

introduction, 320; internal gravity waves and ray-leigh-taylor instability, 324; kelvin-helmholtz instability, 325

45 baroclinic instability

46 instability of the pinch

47 development of linear instability in time and space

initial-value problems, 345; spatially growing modes, 349

48 instability of unsteady flows

introduction, 353; instability of periodic flows, 354; instability of other unsteady basic flows, 361

problems for chapter 6

7 nonlinear stability

49 introduction

landau's theory, 370; discussion, 376

so the derivation of ordinary differential systems governing stability

s1 resonant wave interactions

internal resonance of a double pendulum, 387; resonant wave interactions, 392

s2 fundamental concepts of nonlinear stability

introduction to ordinary differential equations, 398; introduction to bifurcation theory, 402; structural stability, 407; spatial

development of nonlinear stability, 416; critical layers in parallel flow, 420

s3 additional fundamental concepts of nonlinear stability

the energy method, 424; maximum and minimum energy in vortex motion, 432; application of boundary-layer theory to cellular instability, 434

<<流体力学稳定性>>

s4 some applications of the nonlinear theory
benard convection, 435; couette flow, 442; parallel shear flows,
450
problems for chapter 7
appendix. a class of generalized airy functions
a1 the airy functions $a_k(z)$
a2 the functions $a_n(z, p)$, $b_0(z, p)$ and $b_k(z, p)$
a3 the functions $a_k(z, p, q)$ and $b_k(z, p, q)$
a4 the zeros of $a_t(z, p)$
addendum: weakly non-parallel theories for the blasius boundary
layer
solutions
bibliography and author index
motion picture index
subject index

<<流体力学稳定性>>

章节摘录

版权页：插图： An important limitation of Landau's theory is due to the assumption that the interaction of only one mode and its harmonics need be considered. This assumption is plausible if the eigenfunctions of the linearized problem are discrete and simple, so that when the flow is slightly unstable only one normal mode is unstable and all the others decay. When the flow is in an unbounded domain, however, the eigenfunctions depend continuously on a real wavenumber. Then a wavepacket of modes is unstable when the flow is slightly unstable. This in fact occurs for most of the cases we have treated. For example, Fig. 2.2(a) shows that, when a fluid at rest between infinite horizontal planes is heated from below and the Rayleigh number R is slightly supercritical, there is a small band of unstable waves, say $a_1(R)$

<<流体动力学稳定性>>

编辑推荐

《流体动力学稳定性(第2版)(英文版)》是一部全面流体动力学稳定性的专著。

《流体动力学稳定性(第2版)(英文版)》适用于物理、力学专业的研究生、教师和相关科研人员。

<<流体动力学稳定性>>

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>