Chapter 5 provides a very rich description of the subsonic and supersonic flows. Delta wing and thin wing analysis of pitching aerofoil, analysis of simple harmonic plunge are useful for students.

The CFD results presented in Chapter 6 for transonic flows is poor and out of date, presenting the potential flow solver based on the Murman and Cole algorithm. The CFD results conducted in mid-1980s (AGARD) for a finite wing of F5 at M = 0·95 is presented and compared with the experimental results. This is quoted as agreeable results, although the shock strength along the span consistently overestimated by CFD. Modern, high fidelity CFD based on high-resolution methods should produce better solutions, hence the readers should be aware of the limitation of CFD capability 20 years ago compared to what is available today.

Chapter 8 is the main chapter dealing with unsteady aerodynamic issues encountered in external aerodynamics such as flow over wings at high angle-of-attack and the lift generation mechanism due to leading-edge vortices of delta wings. Static and dynamic stalls are discussed. Asymmetric vortex bursting leading to wing rock and the hysteresis curves for yaw and roll of a delta wing is presented. Flapping wing theory is covered in detail making use of stream functions and the vorticity as the kinematic relation of the flow. The flapping wing theory has also been extended to the flexible flapping aerofoil.

The last chapter – Chapter 9 – provides a short outlook for aerodynamic research focusing on UAVs and possible future hypersonic flight and autonomous micro-aircrafts.

Overall, the book provides a good range of analytical equations and insight for special cases ranging from incompressible flows to hypersonic flows, but it is most suitable for undergraduate students to compliment a number of other references available on the subject. The book is also of value to lecturers teaching fundamental aerodynamics to undergraduates but not of huge value to industrial engineers addressing practical applications. Despite the title of the book, the focus has not solely been on unsteady flows; modern numerical methods such as dual time stepping, phase lag boundary conditions are notably missing. No mention of issues for unsteady flows encountered in turbomachinery either; this should have been reflected in the title, e.g. '*External Aerodynamics*' is more appropriate. Publishers should note the void in these important aforementioned topic areas.

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Stability of Structures: Elastic, Inelastic, Fracture and Damage Theories

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World Scientific Publishing Co, 57 Shelton Street, London, WC2H 9HE, UK. 2010. 1011pp. Illustrated. £34. ISBN 978-981-4317-03-0.

This book was first published in 1991 and rapidly became the definitive textbook for postgraduate students. It covered all aspects of stability, linear and nonlinear, was nearly a thousand pages in length with over seven hundred set problems and so many references that one can hardly think of any omissions. This 'new' edition is a paperback but the text is unaltered since the original was mechanically type-set and not conducive to current electronic editing. Instead there are nearly thirty pages of errata, and updates, as an appendix. Hence it is still a worthy book for consideration.

The first 470 pages are devoted to elastic theories but include large deflections. The chapter headings look classical, that is buckling of columns by equilibrium analysis; of frames by equilibrium analysis (including tall buildings and curved arches); dynamic analysis of stability (including non-conservative forces like aerodynamic); energy methods (including snap through and back, asymmetric bifurcation and catastrophe theory, Rayleigh-Ritz and Galerkin); thin-walled beams (both bending and twisting); plates and shells (rectangular plates, cylindrical shells and shallow shells).

The second part of the book (pages 485-952) moves on to inelastic buckling, damage, and fracture. Elasto-plastic buckling starts with classical columns but has treatments of design codes for metal and concrete columns based on finite element solutions. Creep buckling is also covered with examples using laws for concrete.

A large chapter, based on thermodynamics and energy criteria revisits bifurcation and includes internal friction and a non-symmetrical stiffness matrix with simple examples. A chapter on finite strains is treated at the continuum level but eventually admits finite element methods have to be used, but not treated here. A chapter on fracture mechanics is classical, then moves on to nonlinear including *R* curves, 3D hexagonal crack patterns due to shrinkage, and parallel cracks in reinforced concrete.The final long chapter addresses the problem of damage and localisation instabilities. It highlights the problem of strain softening and convergence in finite element methods which occupied the academic community in the 1990s. The concepts are well explained but today's workstations are so powerful that the correct micromechanics can be performed even with tiny elements if necessary.

Summarising, this is a monumental textbook. The number of examples and references is huge. However it is starting to show its age. Most of the analysis is classical mathematics and rigorous, but consequently most of the examples have to be simple columns with hinges etc, avoiding partial differential equations. Numerical solutions are quoted almost as a last alternative. Curiously the Finite Strip method is not quoted (but has proved invaluable for stiffened compression panels and their optimisation).

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Particle Image Velocimetry

R. J. Adrian and J. Westerweel

Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge, CB2 2RU, UK. 2011. 558pp. £75. ISBN 978-0-521-44008-0.

Particle image velocimetry, also commonly known within the fluid mechanics community by the abbreviation PIV, consists of a variety of experimental techniques that allow determining instantaneous velocity vector fields of a fluid by measuring the displacement of small particles in it. PIV methods have been developed for almost 30 years and have become popular flow diagnostics due to their non-intrusive nature and to their capability to yield high-quality measurements.

This book is authored by Professors Ronald J. Adrian and Jerry Westerweel, both of them widely recognised experts in the field of turbulence and optical flow diagnostics. It counts with contributions from a number of other PIV experts including Drs J. Kompenhans and C. Willert, co-authors of the book *Particle Image Velocimetry*: a practical guide by Raffel *et al*, which has been a daily reference guide for many PIV users over the last decade. The book under review provides an updated and even deeper insight into PIV and is bound to become an essential reference tool for students and professionals intending to apply PIV in their experiments.

The core of the book is comprised of chapters 1, 5 and 10, and it is recommended that those relatively new to these techniques start referring to these three chapters for a start. The first chapter presents an introduction to the fundamentals of PIV and the basic single-camera system to measure 2D velocity vectors in a plane in the flow. Chapter 5 goes on to present more advanced methods, starting with the stereoscopic system that allows to measure 3D velocity vectors on a planar domain, and following with a description of volumetric PIV systems that yield 3D velocity vectors over a volume in the flow including photogrammetric, tomographic