

PHYSICS 200AB TEXTS

TEXTBOOKS

Jorge V. José and Eugene J. Saletan (Cambridge UP)

Classical Dynamics : A Contemporary Approach

Self-contained, with a strong geometric bent (often using language of differential geometry). Good treatments of Hamiltonian mechanics and nonlinear dynamics.

A. Fetter and J. D. Walecka (Dover)

Theoretical Mechanics of Particles and Continua

An excellent ‘meat and potatoes’ text on Lagrangian and Hamiltonian mechanics, which also contains several chapters on fluids, heat conduction, and elasticity. Contains an excellent set of problems.

L. D. Landau and E. M. Lifshitz (Butterworth-Heinemann)

Mechanics (Course in Theoretical Physics, volume 1)

Standard fare, economically but powerfully presented; many illuminating worked problems.

Ian Percival and Derek Richards (Cambridge UP)

Introduction to Dynamics

An advanced undergraduate text, the focus of which is on Hamiltonian mechanics.

V. I. Arnold (Springer-Verlag)

Mathematical Methods of Classical Mechanics

That this is published in Springer’s *Graduate Texts in Mathematics* series should be a tip-off. Terse discussion of physics, but masterful nonetheless.

V. I. Arnold (MIT Press)

Ordinary Differential Equations

An outstanding, beautifully written, and modern geometric treatment of ODEs.

C. M. Bender and S. A. Orszag (Springer-Verlag)

Advanced Mathematical Methods for Scientists and Engineers

An outstanding reference. Every theorist should own a copy of this book.

NONLINEAR DYNAMICS

A. J. Lichtenberg and M. A. Liebermann (Springer-Verlag)

Regular and Stochastic Motion

An advanced text on Hamiltonian mechanics, nonlinear dynamics, and chaos.

W. Dittrich and M. Reuter (Springer-Verlag)

Classical and Quantum Dynamics

Light on physical reasoning, but filled with an enormous number of very instructive worked examples from Hamiltonian mechanics. The second half of the book contains an eclectic treatment of quantum theory.

R. Z. Sagdeev, D. A. Usikov, and G. M. Zaslavsky (Harwood Academic)

Nonlinear Physics : From the Pendulum to Turbulence and Chaos

A comprehensive treatment of nonlinear dynamics arising in physical settings.

Steven H. Strogatz (Addison-Wesley)

Nonlinear Dynamics and Chaos

An undergraduate level text, beautifully presented – a genuine pleasure to read. Several fun worked examples.

Michael Tabor (Wiley)

Chaos and Integrability in Nonlinear Dynamics

A broad, unified perspective on classical mechanics and nonlinear dynamics.

Alwynn Scott (Oxford UP) (200B)

Nonlinear Science

An interesting collection of advanced topics.

E. Atlee Jackson (Cambridge UP)

Perspectives of Nonlinear Dynamics (two volumes)

Comprehensive, mathematical and somewhat idiosyncratic treatment of nonlinear dynamics, filled with useful and interesting examples.

Lawrence Perko (Springer)

Differential Equations and Dynamical Systems

FLUID AND CONTINUUM MECHANICS

L. D. Landau and E. M. Lifshitz (Butterworth-Heinemann) (200B)
Fluid Mechanics (Course in Theoretical Physics, volume 6)
Theory of Elasticity (Course in Theoretical Physics, volume 7)

D. J. Acheson (Oxford UP) (200B)
Elementary Fluid Dynamics
A very readable introduction.

NONLINEAR WAVES

G. B. Whitham (Wiley) (200B)
Linear and Nonlinear Waves
This is the bible of nonlinear wave theory, written by one of the masters of the subject.

E. Infeld and G. Rowlands (Cambridge UP) (200B)
Nonlinear Waves, Solitons, and Chaos

PATTERN FORMATION

Daniel Walgraef (Springer) (200B)
Spatio-Temporal Pattern Formation
A good introduction with many examples, but also with its share of typographical errors.

M. I. Rabinovich, A. B. Ezersky, P. D. Weidman (Dover) (200B)
The Dynamics of Patterns

Y. Kuramoto (World Scientific) (200B)
Chemical Oscillations, Waves, and Turbulence

M. C. Cross and P. C. Hohenberg (200B)
Pattern Formation Outside of Equilibrium
Rev. Mod. Phys. **65**, 851-1112 (1993)
The classic review article from this field.