

[Arrowsmith, D. K.](#); [Place, C. M.](#)

Dynamical systems. Differential equations, maps and chaotic behaviour. (English)

[Zbl 0754.34001](#)

London: Chapman & Hall. x, 330 p. (1992).

This is an updated and extended version of the authors' well-known textbook (*) [Ordinary differential equations. A qualitative approach with applications. London (1982; [Zbl 0481.34005](#)); Russian translation: Moscow (1986; [Zbl 0671.34001](#))]. As the authors state, "this book is aimed at second and third year undergraduate students who have completed first courses in Calculus of Several Variables and Linear Algebra. Our approach is to use examples to illustrate the significance of the results presented. The text is supported by a mix of manageable and challenging exercises that give readers the opportunity to both consolidate and develop the ideas they encounter. As in (*), we wish to highlight the significance of important theorems, to show how they are used and to stimulate interest in a deeper understanding of them.

We have retained our earlier introduction and discussion of linear systems (Chapters 1 and 2). Our treatment of non-linear differential equations has been extended to include Poincaré maps and phase spaces of dimension greater than two (Chapters 3 and 4). Applications involving planar phase spaces (covered in Chapter 4 of (*)) appear in Chapter 5. Problems involving non-planar phase spaces and families of systems are considered in Chapter 6, where elementary bifurcation theory is introduced and its application to chaotic behaviour is examined. Although ordinary differential equations remain the driving force behind the book, a substantial part of the new material concerns discrete dynamical systems and the title Ordinary Differential Equations is no longer appropriate. We have therefore chosen a new title for the extended text that clarifies its connection with the broader field of dynamical systems".

Reviewer: [W.Müller \(Berlin\)](#)

MSC:

- [34-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to ordinary differential equations
- [34A26](#) Geometric methods in ordinary differential equations
- [34C23](#) Bifurcation theory for ordinary differential equations
- [37D45](#) Strange attractors, chaotic dynamics of systems with hyperbolic behavior
- [34C05](#) Topological structure of integral curves, singular points, limit cycles of ordinary differential equations
- [34C25](#) Periodic solutions to ordinary differential equations
- [37G99](#) Local and nonlocal bifurcation theory for dynamical systems
- [34C15](#) Nonlinear oscillations and coupled oscillators for ordinary differential equations

Cited in **1** Review
Cited in **39** Documents

Keywords:

[exercises](#); [linear systems](#); [non-linear differential equations](#); [Poincaré maps](#); [phase spaces of dimension greater than two](#); [applications](#); [bifurcation theory](#); [chaotic behaviour](#); [discrete dynamical systems](#)