

**Temam, Roger**

**Infinite-dimensional dynamical systems in mechanics and physics. 2nd ed.** (English)

Zbl 0871.35001

*Applied Mathematical Sciences*. 68. New York, NY: Springer. xxi, 648 p. (1997).

For a review of the first ed. (1988) see [Zbl 0662.35001](#).

This is the second edition of the well-known monograph surveying recent progress on the long-time behaviour of solutions to various types of equations of mathematical physics. General results and concepts on invariant sets and attractors as well as the necessary functional analytic background are contained in the first two introductory chapters. The second part of the book, devoted to the existence of compact attractors to various evolutionary equations is divided into two sections: The former treats the first order in time equations including, e.g., the reaction-diffusion equations, the Navier-Stokes system and other equations of fluid dynamics, the pattern formation equations, while the latter deals with dissipative wave equations like the nonlinear wave equation of relativistic quantum mechanics, the Ginzburg-Landau equation, the Korteweg-de Vries equation etc.

In comparison with the first edition, this book contains some additional material concerning the problems with lack of compactness as it is the case, for instance, for the equations on unbounded spatial domains. The next part contains more precise information on the structure of global attractors, the estimates of their Hausdorff and fractal dimension, and the number of degrees of freedom for various physical systems. The final three chapters, two of which are completely new, are devoted to the existence and properties of inertial sets and manifolds and, in particular, the approximation of attractors and inertial manifolds by smooth finite-dimensional manifolds.

The book will be certainly useful for researchers as well as students and post-graduate students in mathematics, physics and engineering.

Reviewer: [E.Feireisl \(Praha\)](#)

**MSC:**

- [35-02](#) Research exposition (monographs, survey articles) pertaining to partial differential equations
- [35Qxx](#) Partial differential equations of mathematical physics and other areas of application
- [35G10](#) Initial value problems for linear higher-order PDEs
- [35K25](#) Higher-order parabolic equations
- [37D45](#) Strange attractors, chaotic dynamics of systems with hyperbolic behavior
- [35B40](#) Asymptotic behavior of solutions to PDEs
- [35K57](#) Reaction-diffusion equations
- [35L70](#) Second-order nonlinear hyperbolic equations

Cited in **8** Reviews  
Cited in **1163** Documents

**Keywords:**

[long-time behaviour](#); [invariant sets](#); [attractors](#); [Ginzburg-Landau equation](#); [Hausdorff and fractal dimensions](#); [inertial manifolds](#)