

**Hasselblatt, Boris**

**Hyperbolic dynamical systems.** (English) [Zbl 1047.37018](#)

Hasselblatt, B. (ed.) et al., Handbook of dynamical systems. Volume 1A. Amsterdam: North-Holland (ISBN 0-444-82669-6/hbk). 239-319 (2002).

The purpose of this survey paper is to give an account of the key results and to present the basic techniques in the theory of uniformly hyperbolic dynamical systems on compact spaces, as well as to outline extensions to nonuniformly hyperbolic systems.

The author starts with a historical sketch where the development of the hyperbolic dynamics is followed from Poincaré's seminal work to the state-of-the-art research. Then, important definitions and basic examples are presented along with the theory of stable and unstable laminations. Special attention is paid to the stable/unstable manifold theorem which is set as the base for all subsequent material.

Two main methods for proving this key result are described in Section 2, namely, the Hadamard and Perron-Irwin approaches which both rely on successive approximation. It is also pointed out how one can explore some basic facts like Hartman-Grobman theorem, expansivity, shadowing, structural stability by using alternative methods as, for example, the hyperbolic fixed point theorem.

Orbit structure of hyperbolic dynamical systems forms the subject of Section 3, where stability, classification, and invariant measures are discussed.

Several important results on smooth conjugacy and rigidity of hyperbolic dynamical systems are outlined in Section 4.

Finally, the last section deals with nonuniformly hyperbolic systems. The main idea is to present for nonuniformly hyperbolic systems some results analogous to those known for (uniformly) hyperbolic systems and obtained by applying similar ideas, although presented in a different, substantially refined form.

For the entire collection see [\[Zbl 1013.00016\]](#).

Reviewer: [Yuri V. Rogovchenko \(Famagusta\)](#)

**MSC:**

- [37Dxx](#) Dynamical systems with hyperbolic behavior
- [37-02](#) Research exposition (monographs, survey articles) pertaining to dynamical systems and ergodic theory
- [37Cxx](#) Smooth dynamical systems: general theory

Cited in **20** Documents

**Keywords:**

[hyperbolic dynamical systems](#); [topological dynamics](#); [stability](#); [expansivity](#); [shadowing](#); [transitivity](#); [periodic points](#); [invariant measures](#); [smooth conjugacy](#); [cohomology](#); [Lifschitz theory](#); [regularity](#); [moduli](#); [smooth rigidity](#); [Lyapunov exponents](#); [stable manifolds](#); [entropy](#); [horseshoes](#); [Sinai-Ruelle-Bowen measure](#)