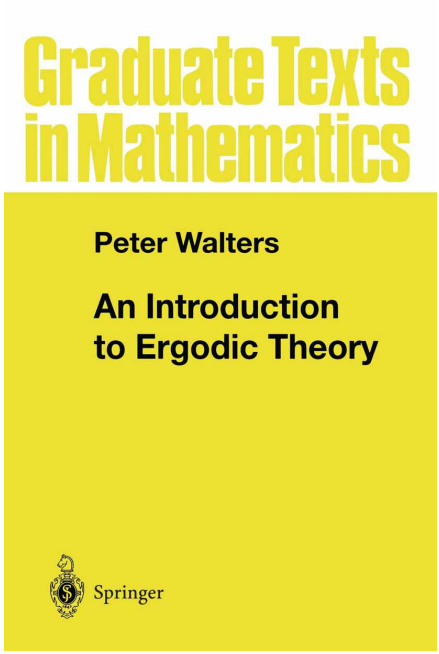


Mathematics : Analysis

Walters, Peter

# An Introduction to Ergodic Theory

This text provides an introduction to ergodic theory suitable for readers knowing basic measure theory. The mathematical prerequisites are summarized in Chapter 0. It is hoped the reader will be ready to tackle research papers after reading the book. The first part of the text is concerned with measure-preserving transformations of probability spaces; recurrence properties, mixing properties, the Birkhoff ergodic theorem, isomorphism and spectral isomorphism, and entropy theory are discussed. Some examples are described and are studied in detail when new properties are presented. The second part of the text focuses on the ergodic theory of continuous transformations of compact metrizable spaces. The family of invariant probability measures for such a transformation is studied and related to properties of the transformation such as topological traitivity, minimality, the size of the non-wandering set, and existence of periodic points. Topological entropy is introduced and related to measure-theoretic entropy. Topological pressure and equilibrium states are discussed, and a proof is given of the variational principle that relates pressure to measure-theoretic entropies. Several examples are studied in detail. The final chapter outlines significant results and some applications of ergodic theory to other branches of mathematics.

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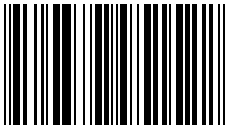

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