

Contents

Chapter 1. Introduction	1
1. Chapter Outline	2
Chapter 2. Markov Processes and the Main Result	7
Chapter 3. Preliminaries: Nonstandard Analysis	15
1. The Hyperreals	18
2. Nonstandard Extensions of General Metric Spaces	19
Chapter 4. Internal Probability Theory	23
1. Product Measures	24
2. Nonstandard Integration Theory	26
Chapter 5. Measurability of Standard Part Map	29
Chapter 6. Hyperfinite Representation of a Probability Space	33
Chapter 7. General Hyperfinite Markov Processes	39
Chapter 8. Hyperfinite Representation for Discrete-time Markov Processes	51
1. General properties of the transition probability	51
2. Hyperfinite Representation for Discrete-time Markov Processes	53
Chapter 9. Hyperfinite Representation for Continuous-time Markov Processes	61
1. Construction of Hyperfinite State Space	62
2. Construction of Hyperfinite Markov Processes	66
Chapter 10. Markov Chain Ergodic Theorem	77
Chapter 11. The Feller Condition	85
1. Hyperfinite Representation under the Feller Condition	86
2. A Weaker Markov Chain Ergodic Theorem	91
Chapter 12. Push-down Results	95
1. Construction of Standard Markov Processes	96
2. Push down of Weakly Stationary Distributions	99
3. Existence of Stationary Distributions	101
Chapter 13. Merging of Markov Processes	103
Chapter 14. Miscellaneous Remarks	107
Acknowledgement	110

Bibliography

113