

TABLE OF CONTENTS

I. General facts about the method, purpose of the paper	1
1. Limit theorems for Markov chains	1
2. Stochastic properties of dynamical systems	2
3. Historical background to the method	3
4. Purpose of the paper	4
II. The central limit theorems for Markov chains	6
1. The concept of quasi-compact operator	6
2. Conditions $\mathcal{H}[m]$ and $\widehat{\mathcal{D}}$, notations \mathcal{N}	8
3. Statements of the central limit theorems	11
III. Quasi-compact operators of diagonal type and perturbations	14
1. Definition, properties	14
2. A perturbation theorem	18
IV. First properties of Fourier kernels, application	23
1. Properties of the Fourier kernels	23
2. Central limit theorem : intermediate result	27
V. Peripheral eigenvalues of Fourier kernels	31
1. Eigenvalues of $Q(t)$ of modulus 1	31
2. Peripheral eigenvalues of $Q(t)$ for small $ t $	34
VI. Proofs of Theorems A, B, C	38
1. Conditions $\mathcal{H}''[m]$. Central limit theorem (Theorem A)	38
2. Development of the characteristic function	38
3. Central limit theorem with a rate of convergence (Theorem B)	39
4. Local central limit theorem (Theorem C)	41
VII. Renewal theorem for Markov chains (Theorem D)	43
1. Statements	43
2. Proof of Theorem VII.2	44
VIII. Large deviations for Markov chains (Theorem E)	49
1. Statement of the main result	49
2. Properties of the Laplace kernels, function c	50
3. Logarithmic estimate : Theorem E-(i)-(ii)	52
4. Probability of a large deviation : Theorem E-(iii)	54
5. Additional statements	58

IX. Ergodic properties for Markov chains	60
X. Markov chains associated with Lipschitz kernels	63
1. General facts, contraction properties	63
2. Invariant distributions and quasi-compactness	64
3. Laplace kernels	70
4. Products of invertible random matrices	75
5. Products of positive random matrices	78
6. Autoregressive processes	79
XI. Stochastic properties of dynamical systems	81
1. Statements	81
2. τ -invariant distribution, relativized Markov kernel	84
3. Proofs of the limit theorems	86
XII. Expanding maps	89
1. Piecewise expanding maps of the interval	89
2. Subshifts and transfer operators	93
XIII. Proofs of some statements in Probability Theory	99
1. Example of a two state Markov chain	99
2. Proof of Lemma IV-5	101
3. Large deviations lemma	102
XIV. Functional analysis results on quasi-compactness	104
1. A sufficient condition for quasi-compactness	104
2. Proof of the perturbation theorem (Theorem III.8)	111
Generalization to the non-ergodic case, by L. Hervé	115
References	141
Indexes	145

Limit Theorems for Markov Chains and Stochastic
Properties of Dynamical Systems by Quasi-Compactness

Hennion, H.; Herve, L.

2001, VIII, 152 p., Softcover

ISBN: 978-3-540-42415-4