PREFACE

The usefulness of techniques from the perturbation theory of operators, applied to a quasi-compact positive kernel Q, for obtaining limit theorems for Markov chains or for describing stochastic properties of dynamical systems, by use of a Perron-Frobenius operator, has been demonstrated in several papers. All these works share the same general features ; the specific features that must be used in each particular case stem from the precise nature of the functional space where the quasi-compactness of Q is proved and from the number of eigenvalues of Q of modulus 1. We give here a general functional analytical framework for this method and we prove the aforementioned asymptotic behaviour within it. It is worth noticing that this framework is sufficiently general to allow the unified treatment of all the cases considered previously in the literature ; the specific characters of every model translate into the verification of simple hypotheses of a functional nature. When applied to Lipschitz Markov kernels or to Perron-Frobenius operators associated with expanding maps, these statements give rise to new results and clarify the proofs of already known properties. The main part of the paper deals with a quasi-compact Markov kernel Q for which 1 is a simple eigenvalue but is not the unique eigenvalue of modulus 1. An essential element of the work is the precise description of the peripheral spectrums of Q and of its perturbations. To conclude the paper, the results previously obtained are extended by the second author to kernels for which 1 is an eigenvalue of multiplicity greater than one.