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Branching Markov processes II

By

Nobuyuki IKEDA, Masao NAGASAWA and Shinzo WATANABE

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The branching property of semi-groups and branching Markov processes were treated in Part I but the problem of construction was not discussed. We shall construct (X^0, π)-branching Markov processes in a probabilistic way. We shall first give a theorem on constructing a strong Markov process from a given Markov process by a piecing out procedure generalizing a method of Volkonsky [44], where a lemma on Markov time due to Courrège and Priouret [4] plays an important role. In chapter III, we shall apply the theorem to obtain (X^0, π)-branching Markov processes and give several examples.

The numbering continues that of the first part, pp. 237-278 of this journal. References such as [1] are to the list at the end of the first part.

II. Construction of a Markov process by piecing out

§2. 1. Construction

Let E be a locally compact Hausdorff space with a countable open base, $(W, \mathcal{B})$ be a measurable space on which a system $\{P_x, x\in E\}$ of probability measures is given, and $\mu(w, dy)$ be a stochastic kernal on $(W, \mathcal{B})\times(E, \mathcal{B}(E))$.[1] Let $\Omega = W\times E$, $\mathcal{F} = \mathcal{B}\otimes\mathcal{B}(E)$ and

1) We assume that, for every $B\in\mathcal{B}$, $P_x[B]$ is $\mathcal{B}(E)$-measurable in x. A *stochastic kernel* $\mu(w, dy)$ is a kernel such that for each w it is a probabillity in dy.