Circulation theory of enzyme kinetics

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Here we adopt the presentation given by Kalpazatidou. Let $(\xi_l)_{l\geq 0}$ be a discrete-time Markov chain with finite state space S defined on some space $(\Omega, \mathcal{F}, P)$.

Definition 0.1. Let $\{\mu_n : n \in N^*\}$ be a family of probability measures on a Polish space E. Then we say that $\{\mu_n : n \in N^*\}$ satisfies a large deviation principle with rate n and good rate function $I : E \to [0, \infty]$ if:

(i) for each $\alpha > 0$, the level set $\{x \in E : I(x) < \alpha\}$ is compact in E;

(ii) for each closed subset F of E,

$$\limsup_{n\to\infty} \frac{1}{n} \log \mu_n(F) \leq - \inf_{x\in F} I(x); \tag{1}$$

(iii) for each open subset U of E,

$$\liminf_{n\to\infty} \frac{1}{n} \log \mu_n(U) \geq - \inf_{x\in U} I(x); \tag{2}$$