

**Exponential moments of hitting times for  
time-inhomogeneous atomic Markov chains**

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The result we present is devoted to studying exponential moments of hitting times for time-inhomogeneous Markov chains. It is well-known that a necessary and sufficient condition for the existence of such a moment for a homogeneous Markov chain is a drift condition of the form  $PV \leq \lambda V + b\mathbb{1}_C$ ,  $\lambda < 1$ . We generalized this result to the time-inhomogeneous case and proved that it is sufficient to have a similar drift condition with different  $\lambda_t$  at different time steps  $t$ . We showed that homogeneous condition  $\lambda < 1$  could be relaxed in the time inhomogeneous case.

The second result of the presentation is related to studying the simultaneous hitting time for an atom  $\alpha$  by two time-inhomogeneous Markov chains. We established conditions for the existence of the exponential moment for the hitting time and found computable bounds using the drift condition described above.