

---

**GUANGYUE HAN**, University of British Columbia

*Analyticity of Hidden Markov Chains*

We prove that under a mild positivity assumption the entropy rate of a hidden Markov chain varies analytically as a function of the underlying Markov chain parameters. We give examples to show how this can fail in some cases. And we study two natural special classes of hidden Markov chains in more detail: binary hidden Markov chains with an unambiguous symbol and binary Markov chains corrupted by binary symmetric noise. Finally, we show that under the positivity assumption the hidden Markov chain *itself* varies analytically, in a strong sense, as a function of the underlying Markov chain parameters.