Thesis Abstract:

Mixing in Markov chains derived from dynamical heat conduction models.

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In this thesis we investigate a heat conduction model and corresponding Markov chains. A proof, that were believed to give definitive answers regarding one specific Markov chain, has turned out to have some problems, requiring further investigation.

Our goal was to determine how its spectral gap behaves as we increase the number of interacting particles N. We have used computer assisted calculations to determine restricted versions of the Dirichlet operator and calculate their spectral gaps. Then, taking a two fold limit, mostly by fitting different curves onto procured results, we have obtained an approximation for the value of the original operator's gap.

Throughout the thesis we put an emphasis on symbolic calculations, reducing the occurring numerical errors to a minimum. Eventually, this method produces some reliable estimations of our spectral gap. The results are convincing that the spectral gap (appropriately normalized) is $\geq \frac{const}{N}$, just as is necessary for the discussion of the hydrodynamic limit.

We conclude by pointing out that this method could be applied to many related spectral gaps.