Report On Using MCMC Method To Find Hamiltonian And Thermalizaion of Berry-Keating And Damped Harmonic Oscillator

Preliminaries

Hamiltonian of Berry-Keating

$$H = \frac{1}{2}(xp + px) \tag{1}$$

and Damped Harmonic oscillator

$$H = \frac{p^2}{2m} + \frac{1}{2}m\omega^2 x^2 - \frac{p}{m} \tag{2}$$

We're using MCMC method to evaluate Hamiltonian and Thermalization of Berry-Keating and Damped harmonic oscillator.

Methodology

Markov Chain Monte Carlo (MCMC) is a random sampling method to visit x with a probability proportional to some given distribution say, $\pi(x)$. To use MCMC in simulation we first simplify the Hamiltonian Monte Carlo code in a block manner. Then we calculate and plot $< H >$ graphs of Berry-Keating and Damped harmonic oscillator Hamiltonian.

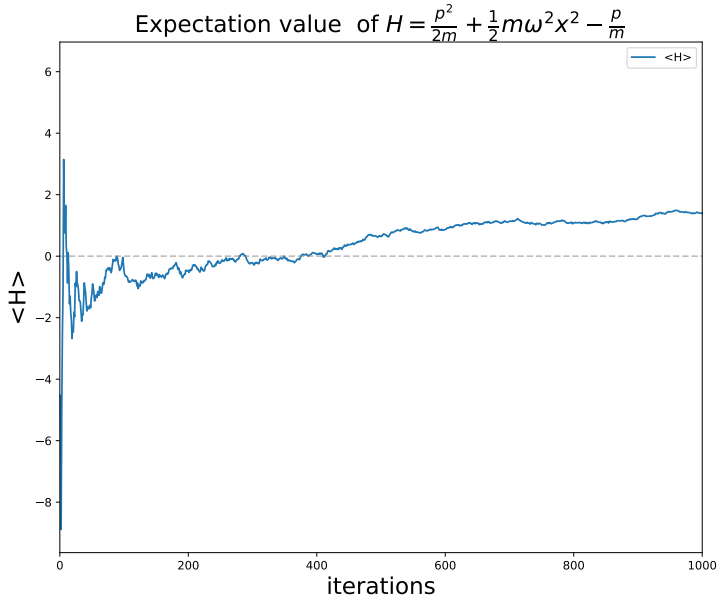

Figure 1: Graph of Expectation value of Damped Harmonic Oscillator

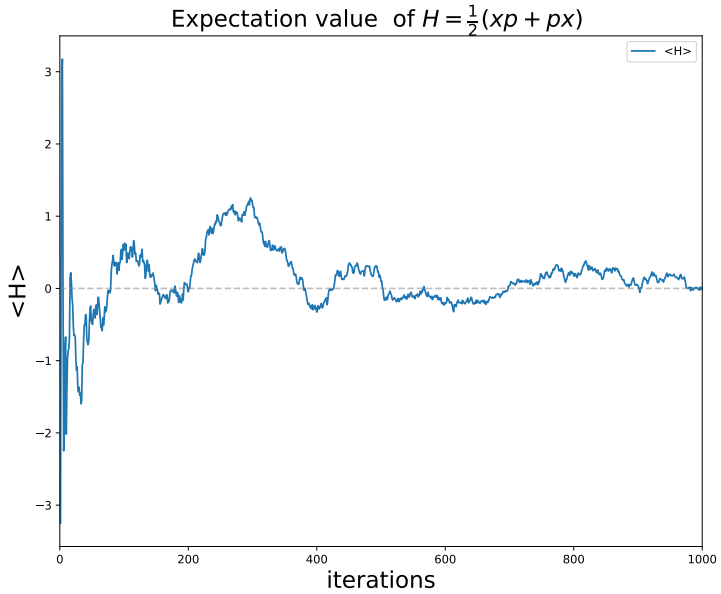

Figure 2: Graph of Expectation value of Berry-Keating