Stochastic fluctuating model for two cilia synchronization

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Energy dissipation in a noise synchronizing system?
in the weak coupling & weak noise approximation

Model:

$$\begin{aligned}\frac{d\phi_1}{dt} &= \omega_t + K\omega\sin(\phi_2-\delta)\sin\phi_1 + \sqrt{2D}\sqrt{\omega}\xi_1 \\ \frac{d\phi_2}{dt} &= \omega_t + K\omega\sin(\phi_1-\delta)\sin\phi_2 + \sqrt{2D}\sqrt{\omega}\xi_2\end{aligned}$$

Results:

- The synchronized state maximizes the heat dissipation related to the detail of trajectory.
- Computed the heat release specifically on the first order approximation and found it's time-dependence.