

1D Slow oscillations ($A \ll C_0$) (Numerical)

In this case we do not have any model, because $C(t)$ takes negative values along the period. Here we compare the results of simulations with the **kink's dynamics model** developed for **slow** oscillations, even if the hypothesis under which it has been developed are not true. We **also** show that the model is **wrong** if $A \sim C_0$ (are of the same order) even if $C(t)$ is strictly positive!

(Extended) Kink dynamics model

Consider a system with only two kinks. According to the kink's dynamics model, their distance decays as

$$\dot{d}(t) \simeq -24\sqrt{2}C(t)^{\frac{1}{2}}[e^{-2^{\frac{1}{2}}C(t)^{\frac{1}{2}}d} - e^{-2^{1/2}C(t)^{1/2}(L-d)}]$$

where L is the size of the simulation box.

What if $C(t) < 0$?

In order to consider also cases where $C(t)$ takes negative values, we **extend** the model **assuming there is no interaction** between the kinks when $C(t) < 0$.

The variation of the distance over a period (assuming the distant to be constant inside the integrand)

$$\Delta d(d) = \int_0^T (\partial_t d) dt$$

Simulations

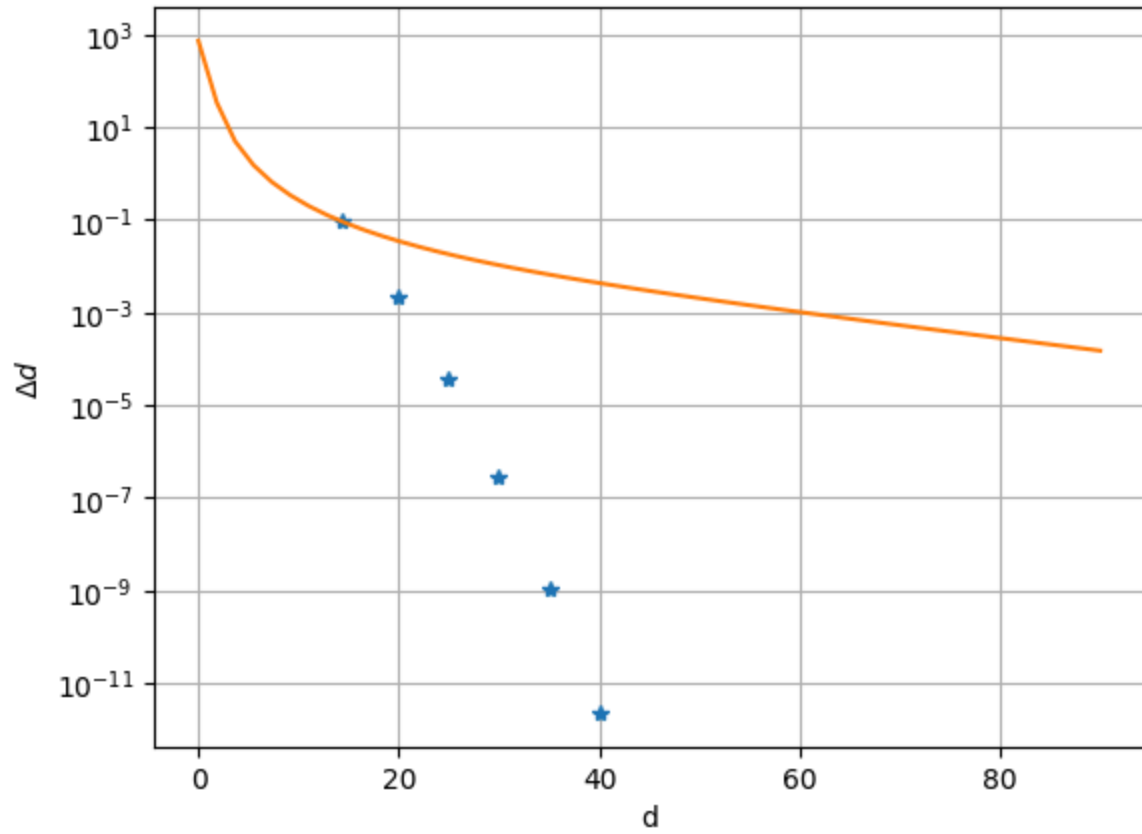
In the following simulations

- The **orange** line: is the kinks dynamics model's prediction.
- The **blue** dots: are the experimental values (simulations)
To **collect the data**
- Simulation of $\sim 10^2 T$ seconds were launched for many values of the initial distance d_0
- The quantity Δd has been calculated considering data with $t > 10T$, to cancel the influence of the initial state's preparation.
- The value displayed on the x-axis is the distance at the beginning of the period.

$$A \gg C_0$$

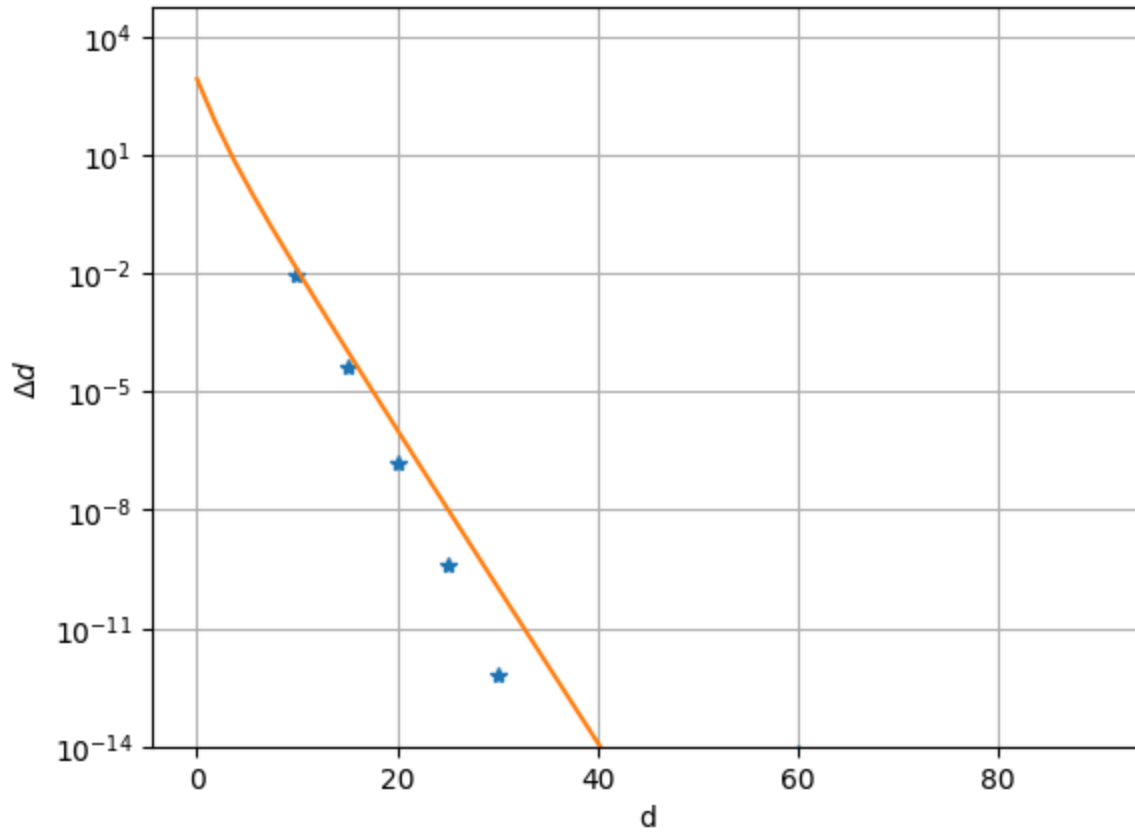
Variation of the distance of twokinks over one period T

$$C(t) = 1 + 1.75\sin(2\pi t/25)$$

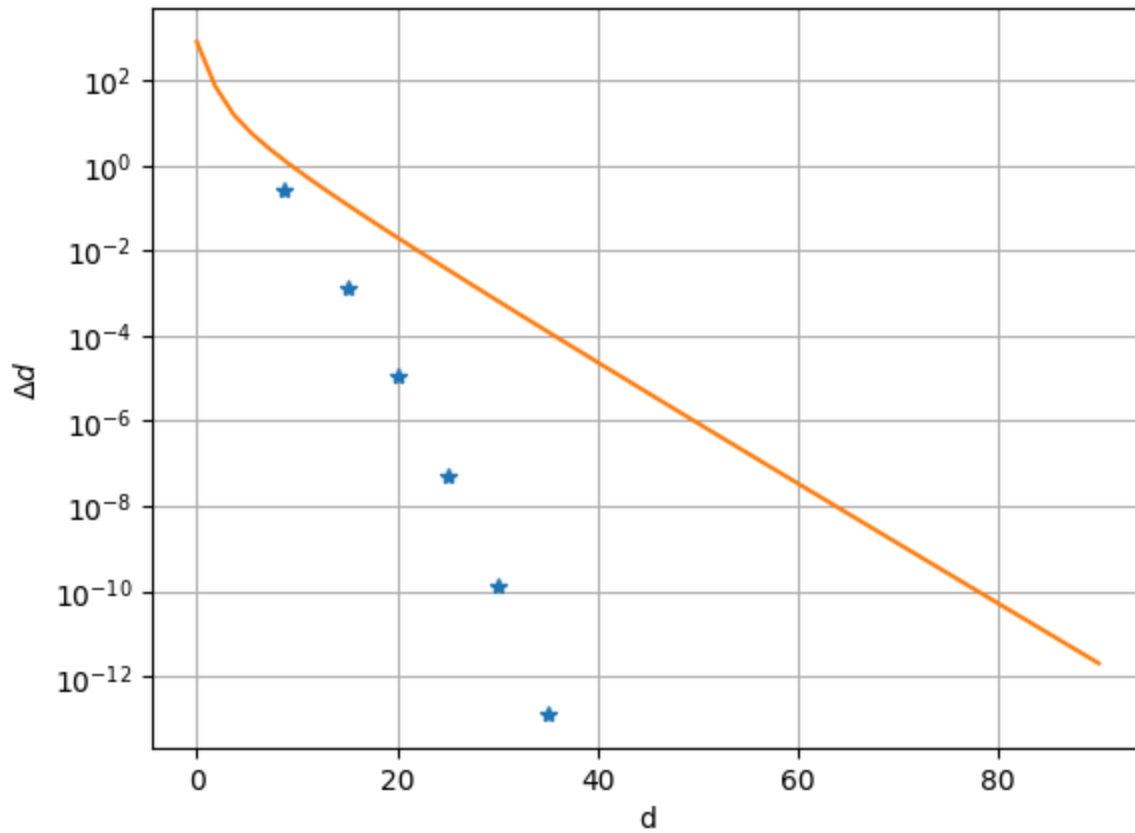


$$A \sim C_0$$

Variation of the distance of twokinks over one period T
 $C(t) = 1 + 0.6\sin(2\pi t/25)$

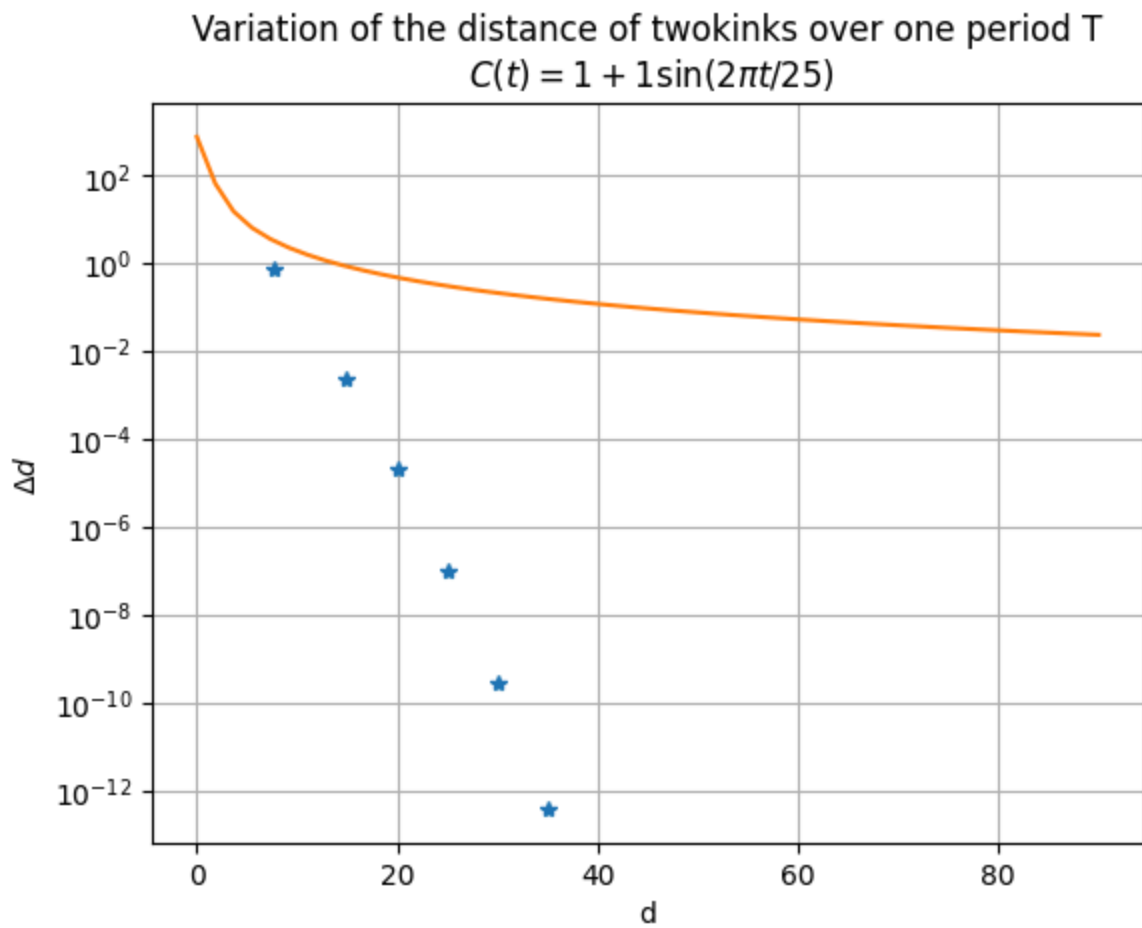


Variation of the distance of twokinks over one period T
 $C(t) = 1 + 0.95\sin(2\pi t/25)$



$$A = C_0$$

Here the model predicts a power-law decay. **Instead** an exponential decay is measured!



Linear dynamics

$$\ell = \frac{2\pi}{\langle q^2 \rangle^{1/2}} \sim t^{1/2}$$

$$\tau_{linear} \sim C(t)^{-1}$$

