Comparing the decay of the distance of two kinks when C is constant or oscillating

#negativeC #1D #twokinks

Varying the period T$

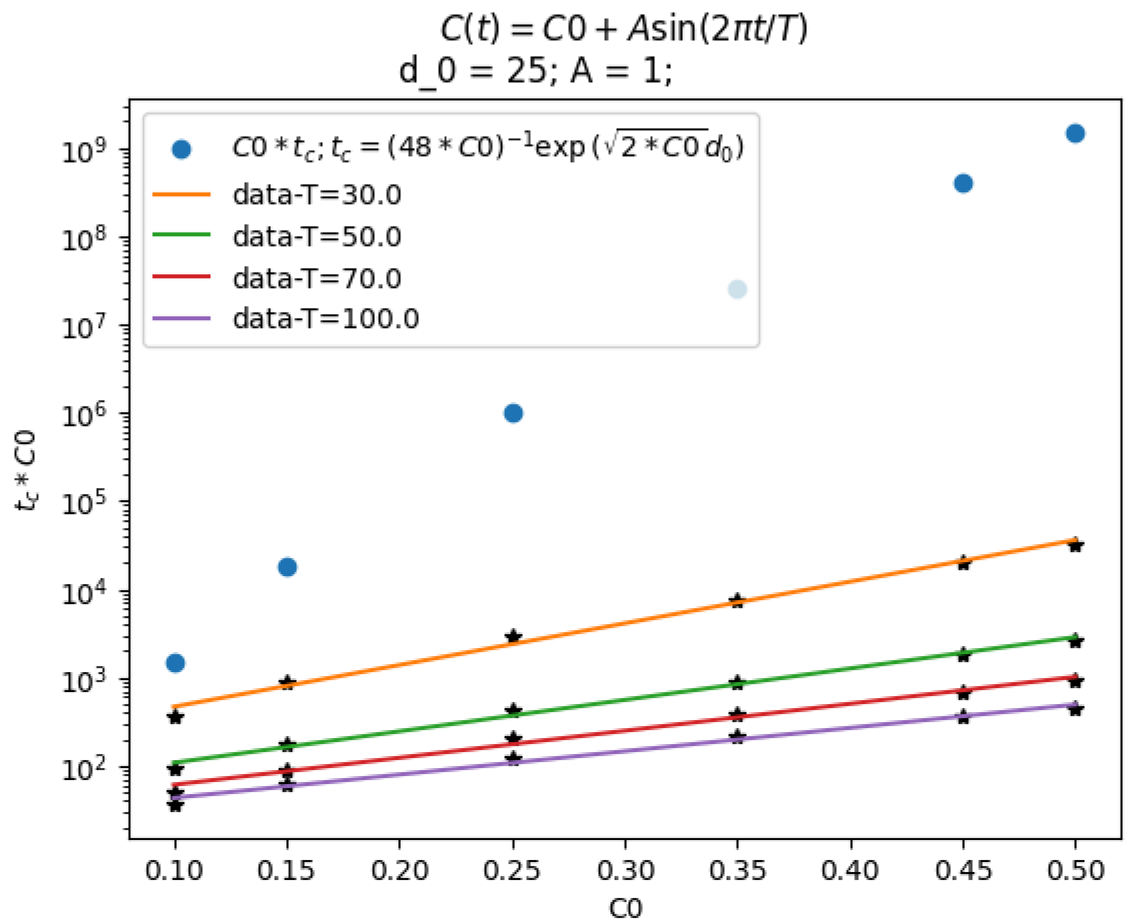
Here we fix:

- The initial distance $d_0 = 25$;
- The Amplitude A of $C(t)$: $A = 1$.
  We plot the annihilation time t_c as a function of the average value of the oscillation $\bar{C}$ in a log-log scale. Remember from Effective dynamics of kinks that, if C is constant and positive, then

$$t_c = \frac{1}{48C} \exp\left(\sqrt{2C} d_0\right)$$

So,

$$\log(t_c C) \sim \sqrt{2} d_0 \sqrt{C}$$



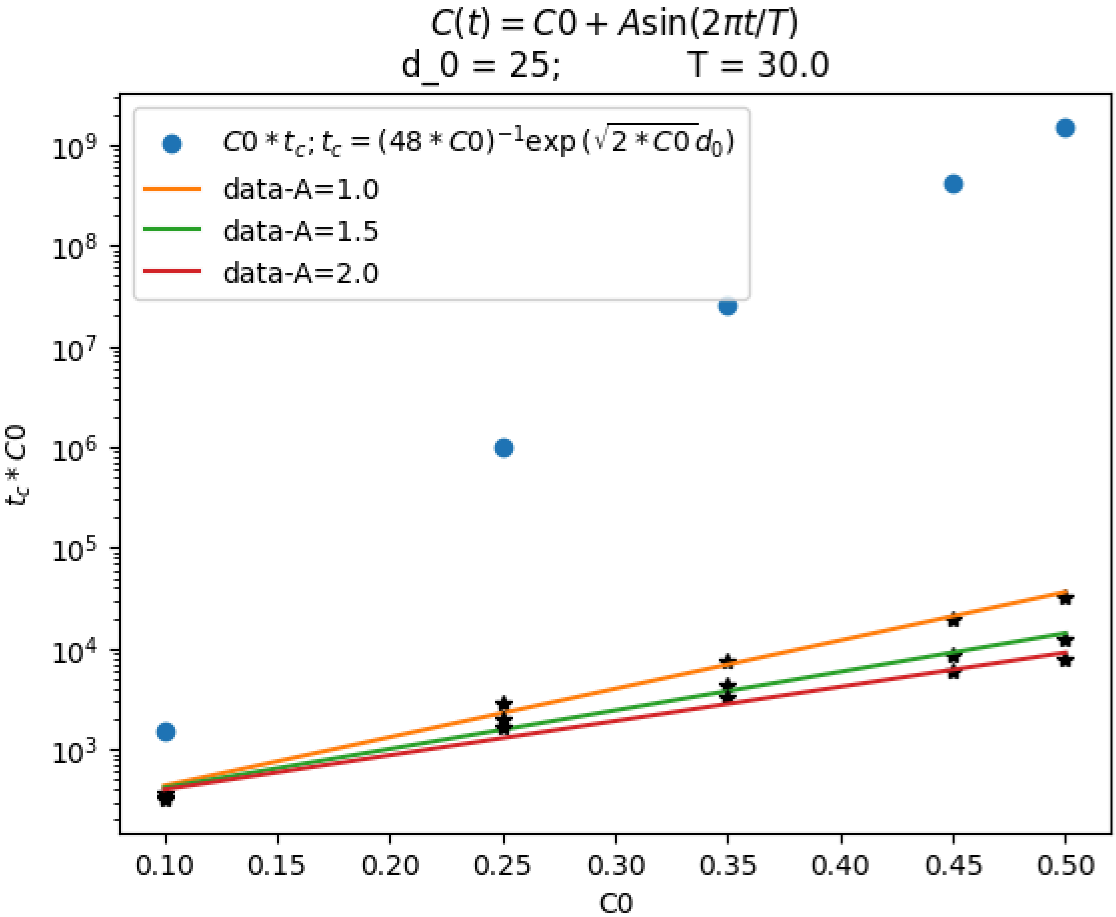
(the slope of the orange (T=30) is about 10 in the semilogy scale: about variation of factor x10 in y-axis each variation of 0.1 on x-axis).

Comments

- In the limit of small period (fast oscillations) the data seems to move towards the curve expected for constant $C = C0$. This is coherent with what we expect in the fast oscillations limit, where the shape of the kinks does not change significatively during a period and so the calculations in Effective dynamics of kinks, where the kink is assumed to propagate without changing shape, can be applied.
- The annihilation time scales too quickly with the decrease of the period, so data for short periods T or large average values $C0$ cannot be collected.
- Data seems to lay on a line, but it could be just the beginning of a square root or other functions.

Varying A

Here we fixed $d_0 = 25$ and the period of the oscillation $T = 30$.



$C(t) = C0 + A\sin(2\pi t/T)$
d_0 = 25;   T = 30.0
$C0 * t_c; t_c = (48 * C0)^{-1}\exp(\sqrt{2 * C0}\, d_0)$
data-A=1.0
data-A=1.5
data-A=2.0
$t_c * C0$
10^9
10^8
10^7
10^6
10^5
10^4
10^3
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
0.50
C0