Sampling the asymptotic dynamics of two isolated kinks, while it is accelerated by oscillatory C(t)

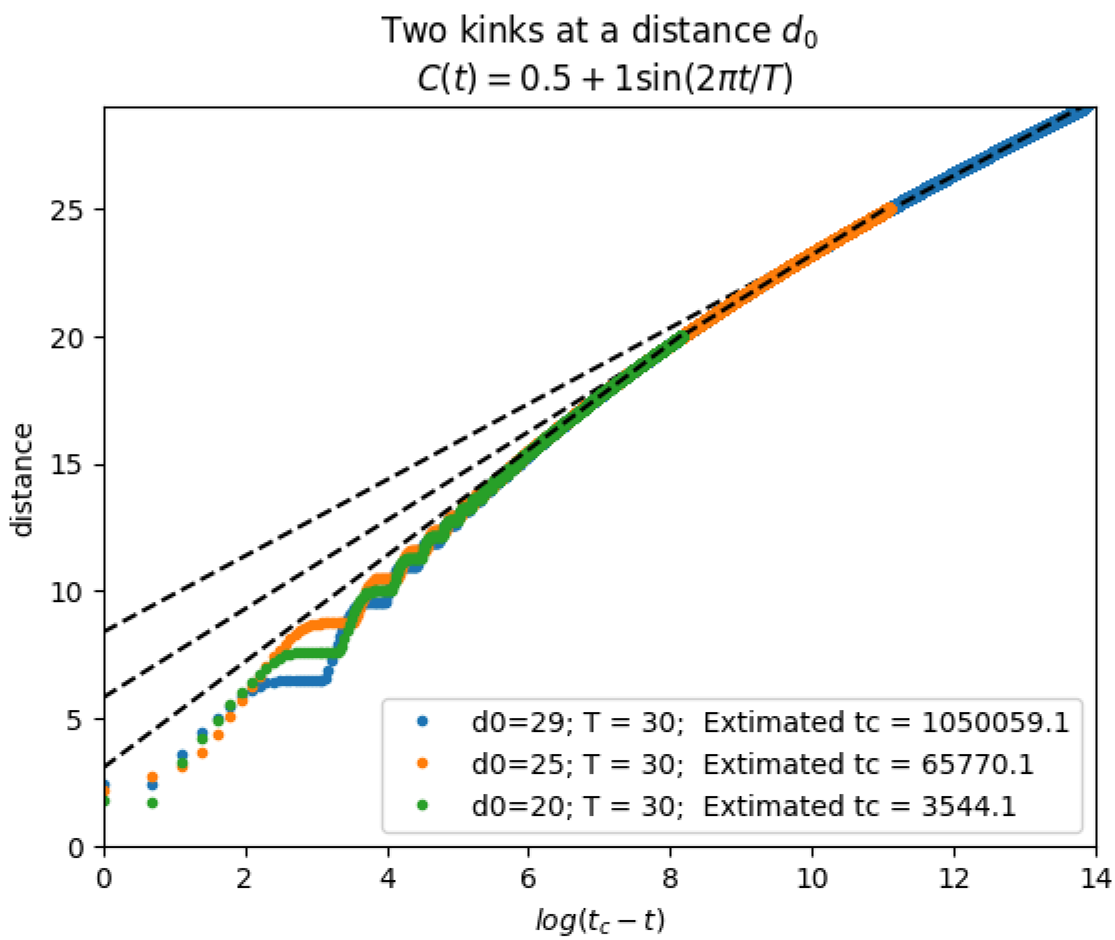
#twokinks #1D #negativeC

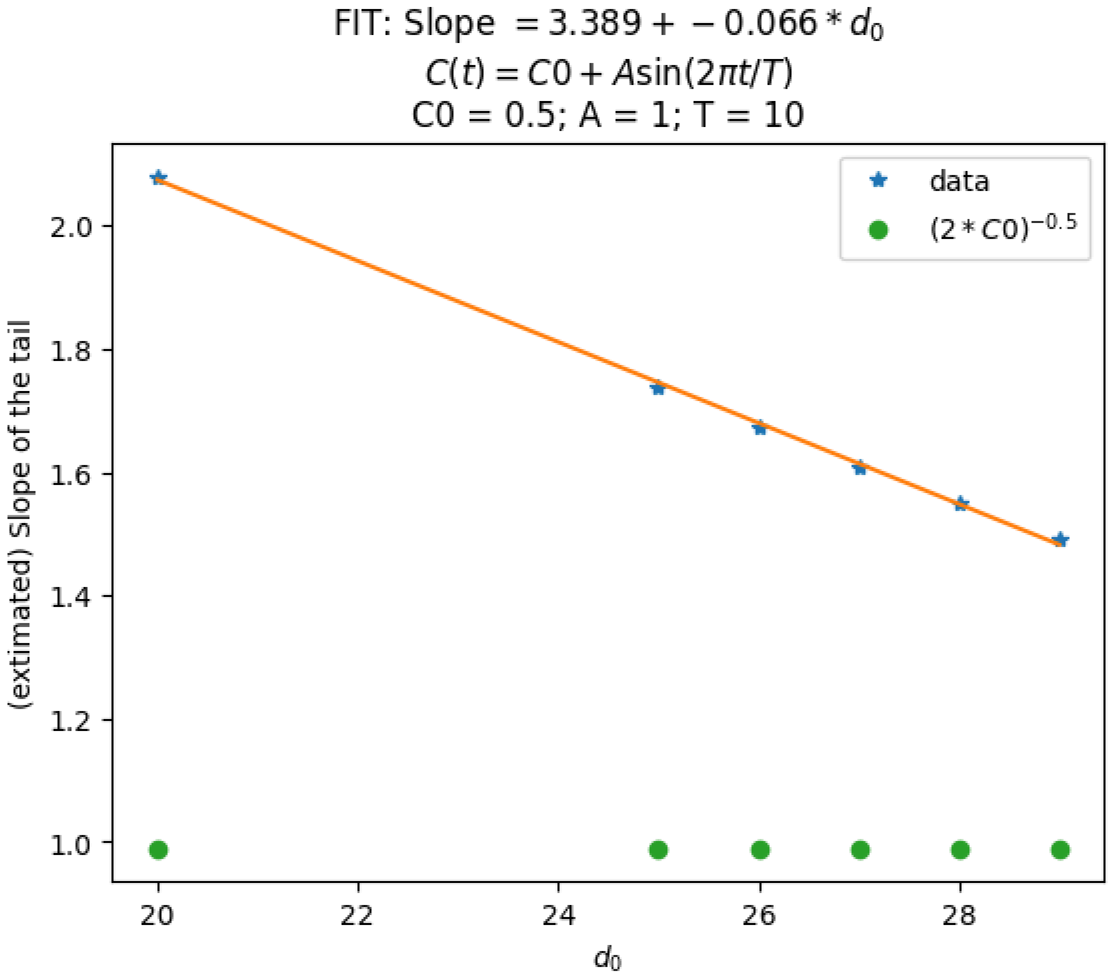
In a plot of the distance v.s. the logarithm of (t-t_c), **it is not clear** whether there is a linear dependance of the two quantities when $t >> t_c$ (Controlling the annihilation of two isolated kinks). In fact, there seems to be the "beginning" of a linear asymptotic tail (as it is slightly curved) but it is not possible to sample more the tail, as the annihilation (that is the duration of the simulation) grows so badly with the initial distance. In fact, **if** the tail is really linear, then

$$d(t) \sim \log(\tau_A - t) \implies \tau_A \sim e^{d_0}$$

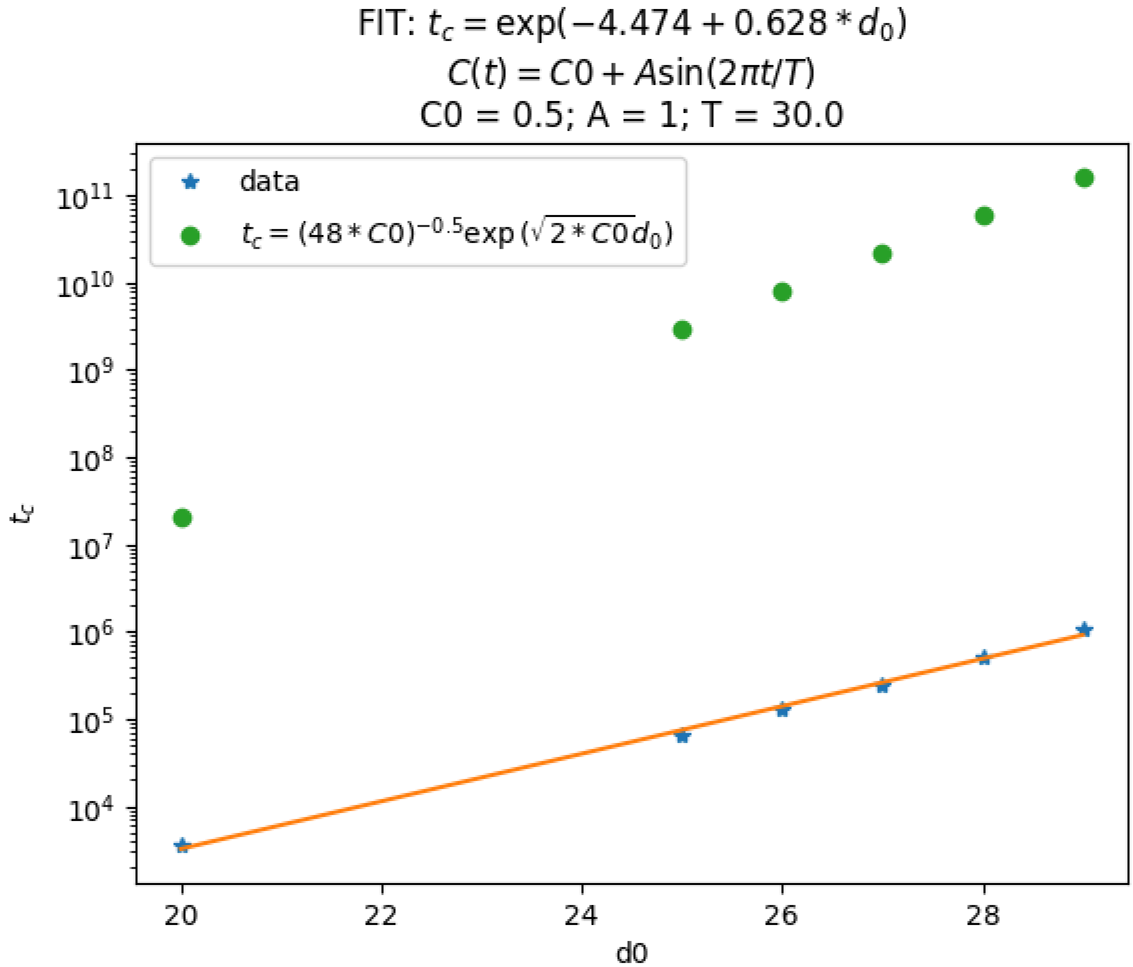
Here I present some simulations for various value of d_0, that means the tail is more sampled as d_0 increases. The slope of the decay and the annhilation time are presented as a function of d_0.

- T=30



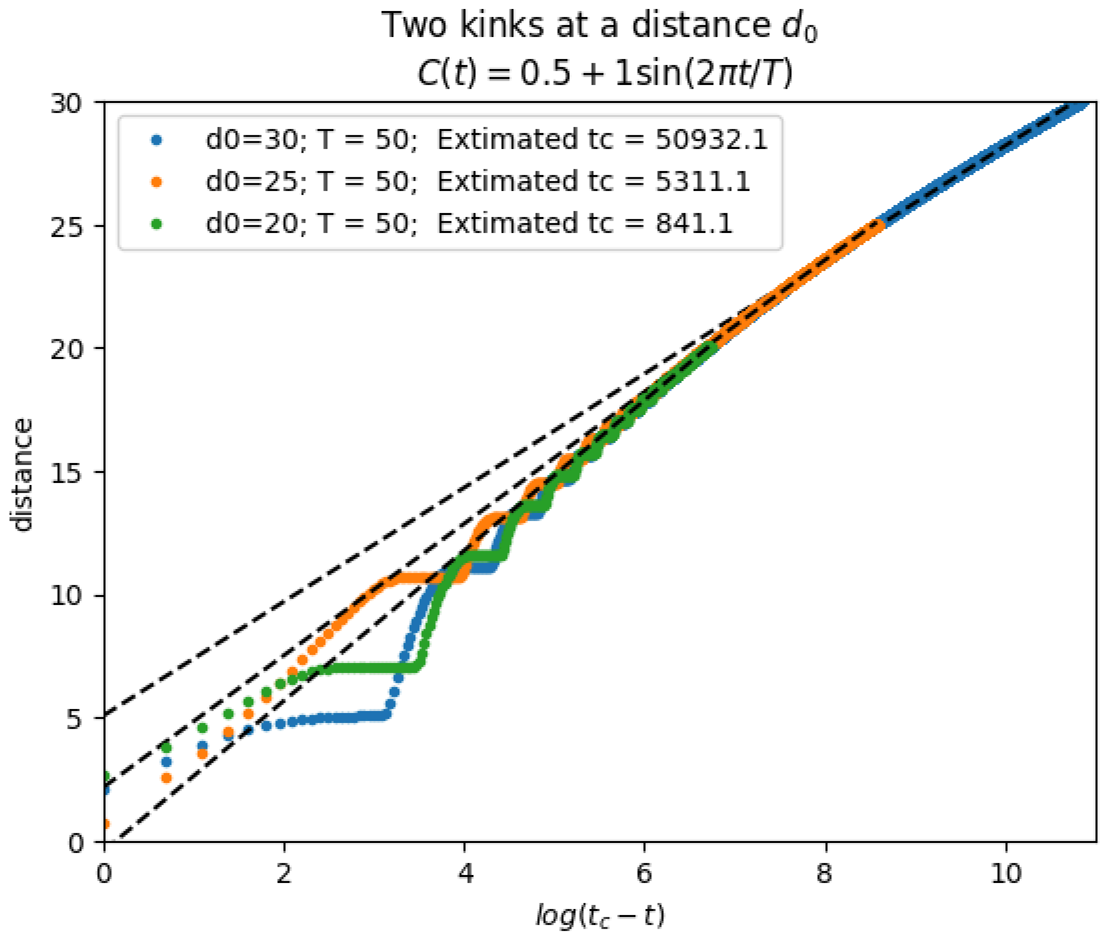


FIT: Slope $= 3.389 + -0.066 * d_0$
$C(t) = C0 + A\sin(2\pi t/T)$
C0 = 0.5; A = 1; T = 10
data
$(2 * C0)^{-0.5}$
(extimated) Slope of the tail
d_0
2.0
1.8
1.6
1.4
1.2
1.0
20
22
24
26
28

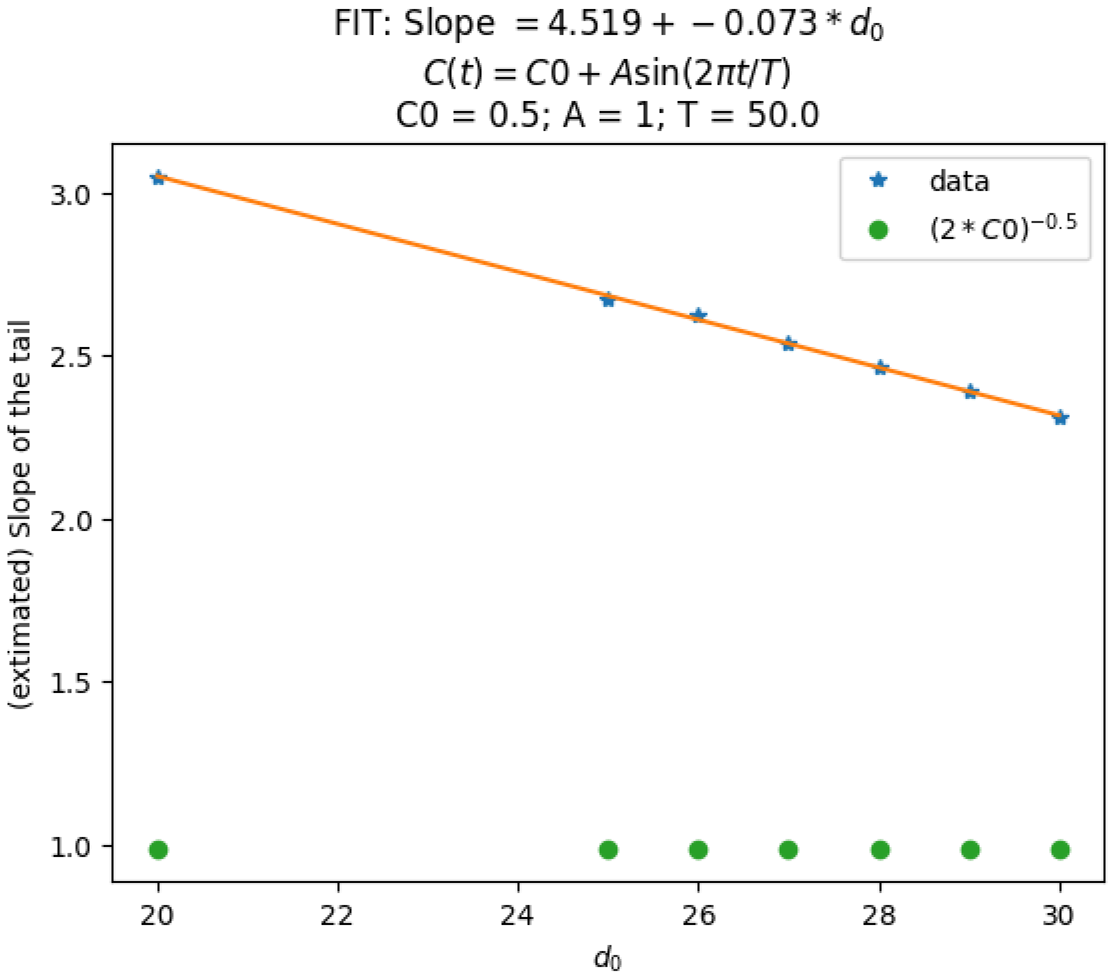


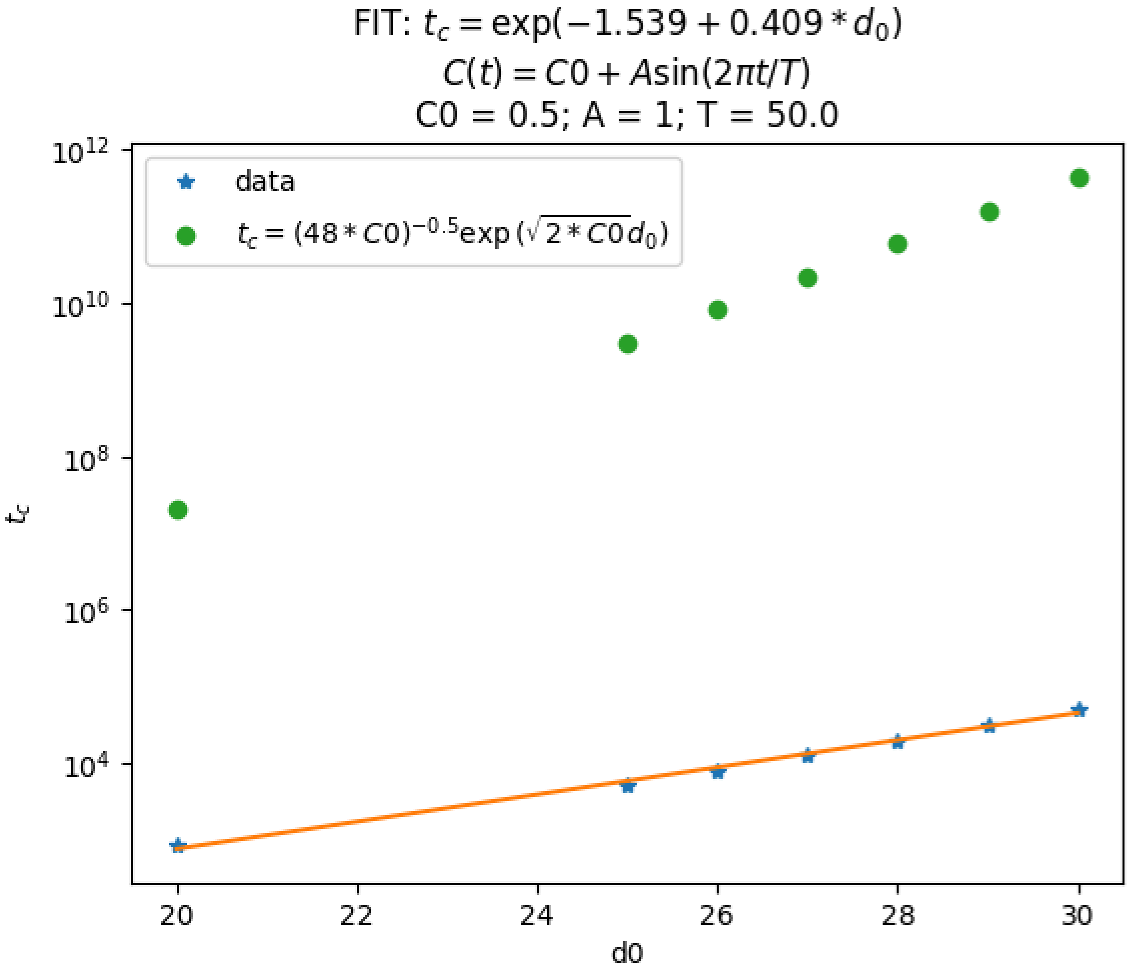
FIT: $t_c = \exp(-4.474 + 0.628 * d_0)$
$C(t) = C0 + A\sin(2\pi t/T)$
C0 = 0.5; A = 1; T = 30.0
data
$t_c = (48 * C0)^{-0.5}\exp(\sqrt{2 * C0} d_0)$
t_c
d0
10^{4}
10^{5}
10^{6}
10^{7}
10^{8}
10^{9}
10^{10}
10^{11}
20
22
24
26
28

- T=50



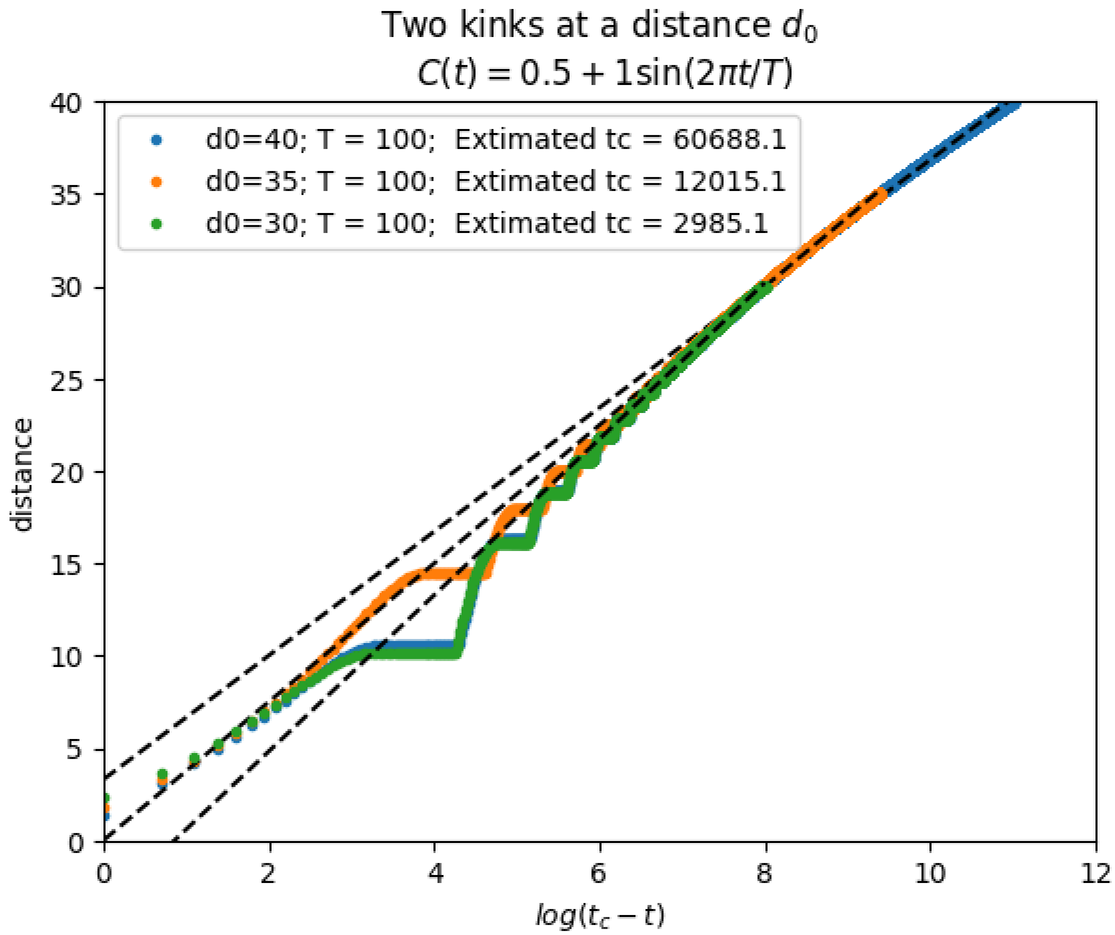
Two kinks at a distance d_0
$C(t) = 0.5 + 1\sin(2\pi t/T)$
d0=30; T = 50; Extimated tc = 50932.1
d0=25; T = 50; Extimated tc = 5311.1
d0=20; T = 50; Extimated tc = 841.1
distance
$log(t_c - t)$


FIT: Slope $= 4.519 + -0.073 * d_0$
$C(t) = C0 + A\sin(2\pi t/T)$
C0 = 0.5; A = 1; T = 50.0
data
$(2 * C0)^{-0.5}$
(extimated) Slope of the tail
3.0
2.5
2.0
1.5
1.0
20
22
24
26
28
30
d_0

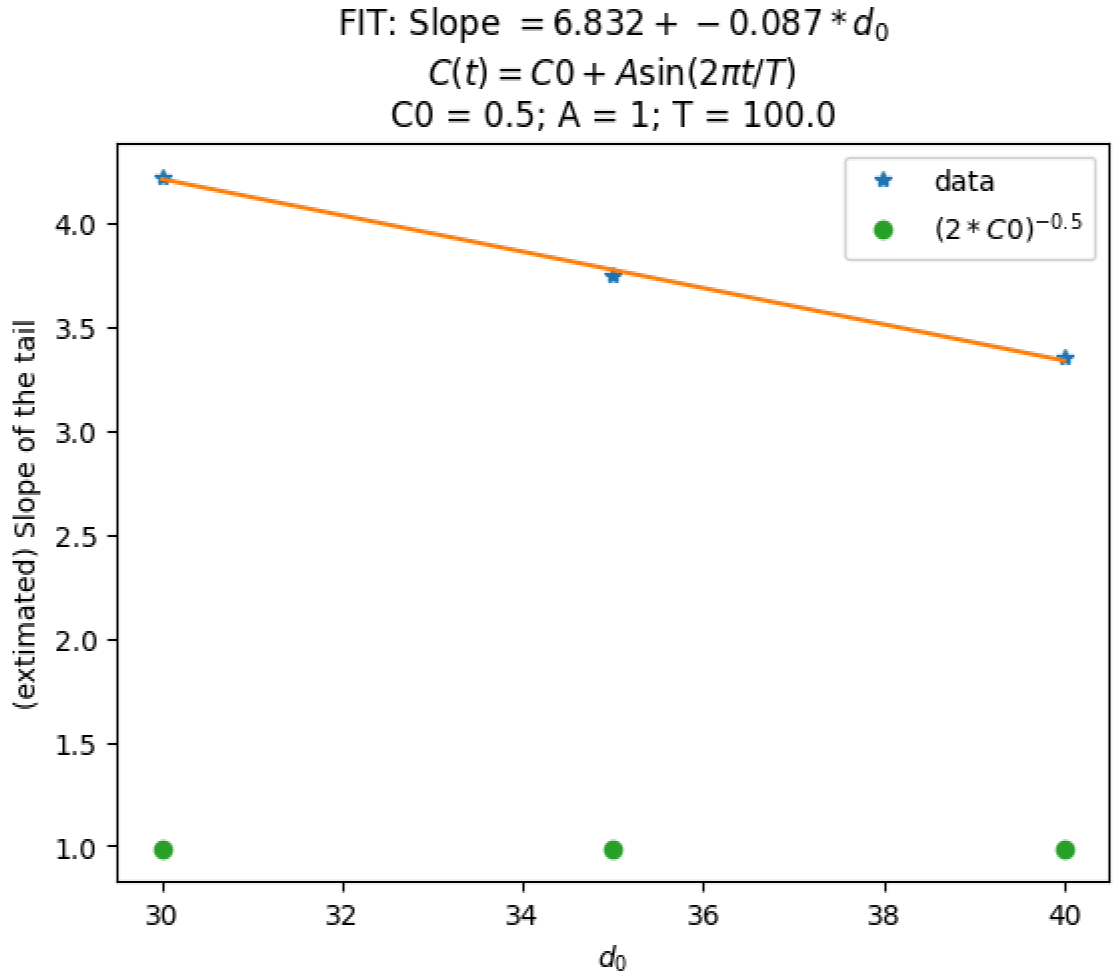


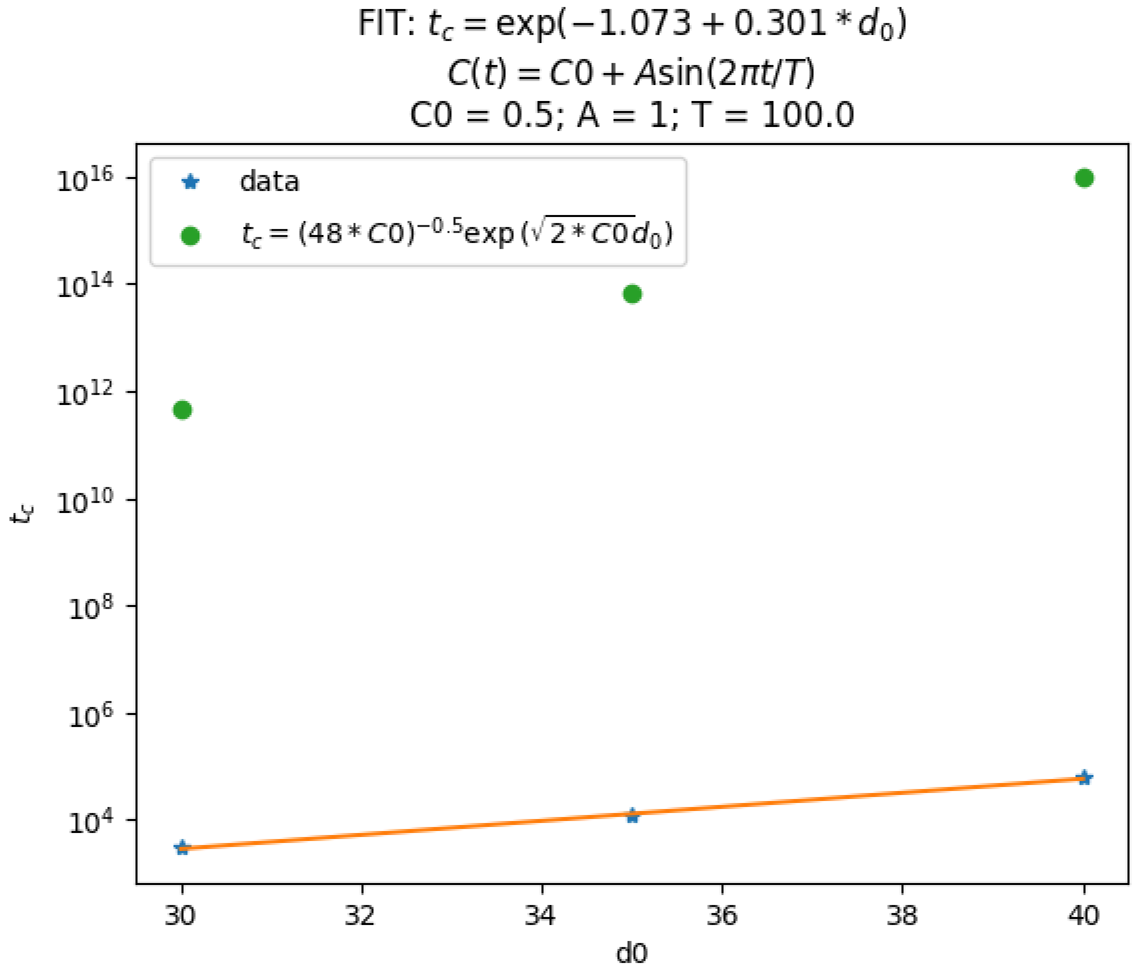
FIT: $t_c = \exp(-1.539 + 0.409 * d_0)$
$C(t) = C0 + A\sin(2\pi t/T)$
C0 = 0.5; A = 1; T = 50.0
data
$t_c = (48 * C0)^{-0.5}\exp(\sqrt{2 * C0}d_0)$
t_c
d0
10^{12}
10^{10}
10^{8}
10^{6}
10^{4}
20
22
24
26
28
30

- T = 100

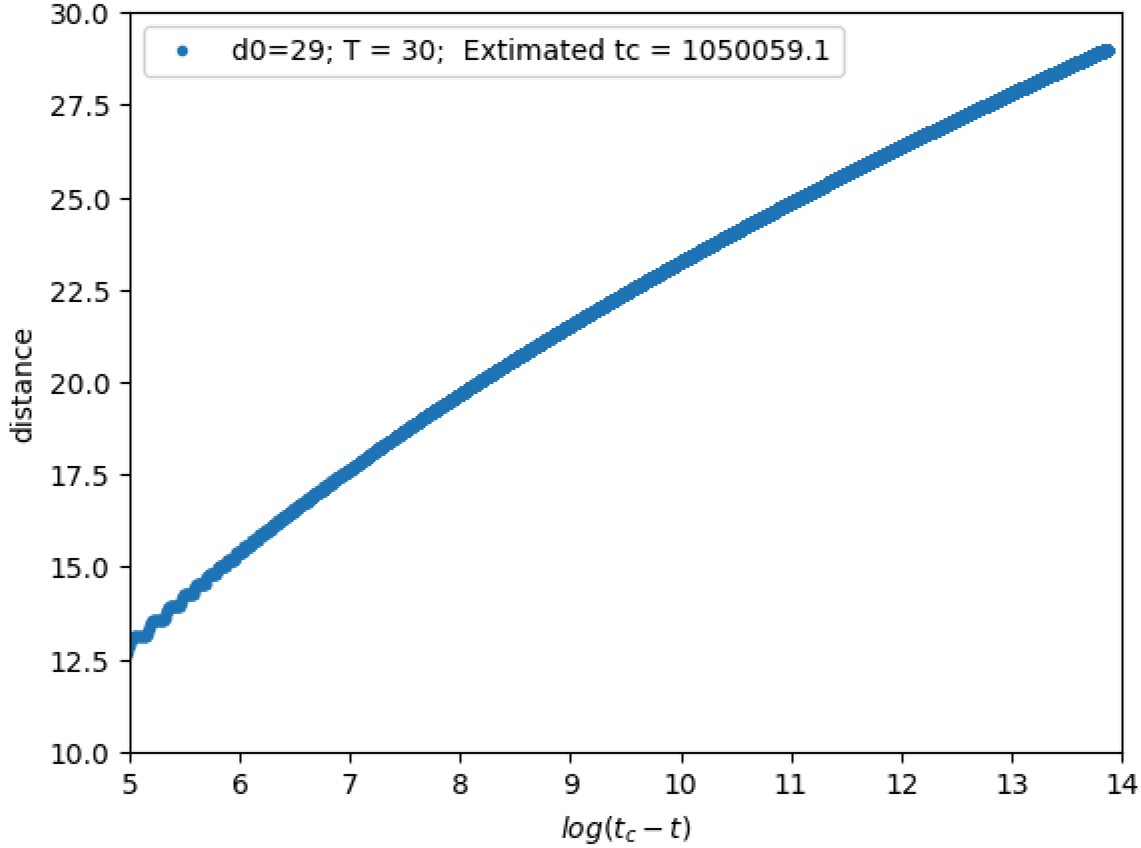


Two kinks at a distance d_0
$C(t) = 0.5 + 1\sin(2\pi t/T)$
d0=40; T = 100; Extimated tc = 60688.1
d0=35; T = 100; Extimated tc = 12015.1
d0=30; T = 100; Extimated tc = 2985.1
distance
$log(t_c - t)$
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12

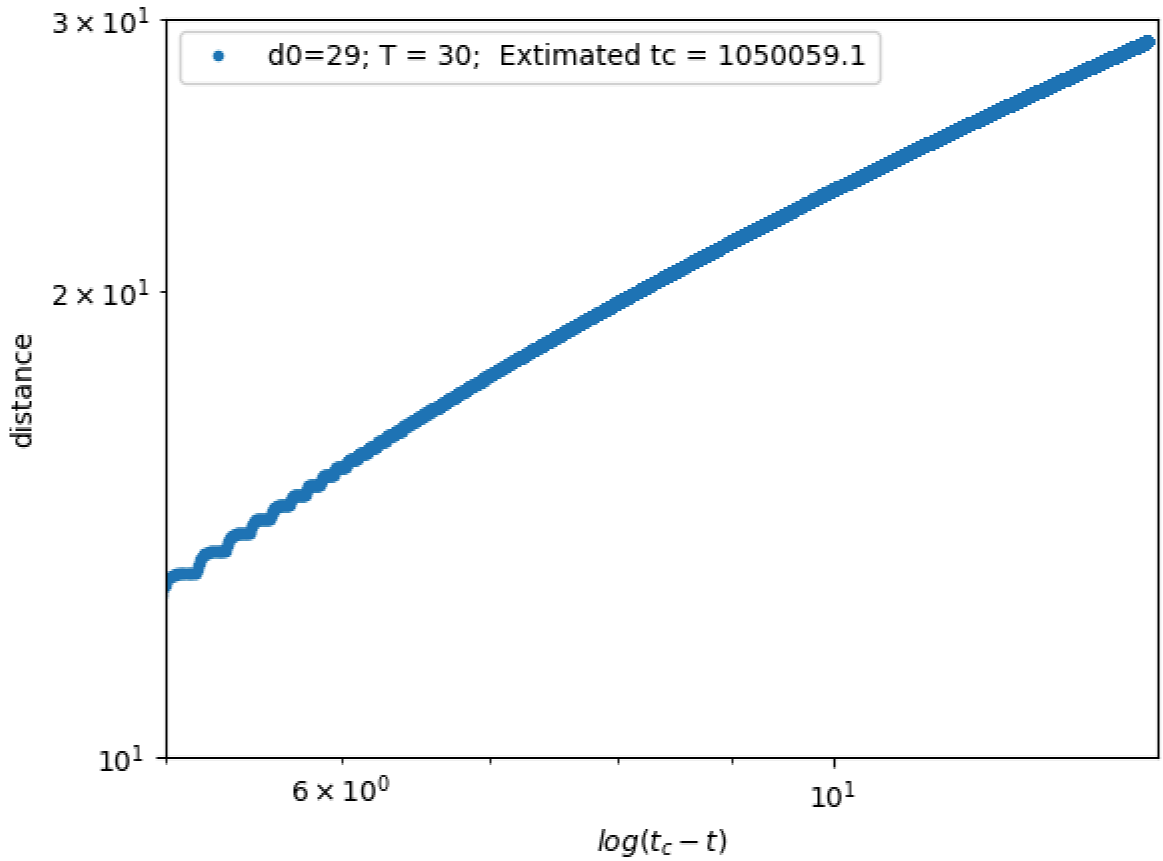

FIT: Slope $= 6.832 + -0.087 * d_0$
$C(t) = C0 + A\sin(2\pi t/T)$
C0 = 0.5; A = 1; T = 100.0
data
$(2 * C0)^{-0.5}$
(extimated) Slope of the tail
4.0
3.5
3.0
2.5
2.0
1.5
1.0
30
32
34
36
38
40
d_0



Deviation from the logarithmic decay



d0=29; T = 30; Extimated tc = 1050059.1
30.0
27.5
25.0
22.5
20.0
17.5
15.0
12.5
10.0
distance
5
6
7
8
9
10
11
12
13
14
$log(t_c - t)$



d0=29; T = 30; Extimated tc = 1050059.1
3×10^1
2×10^1
10^1
distance
6×10^0
10^1
$log(t_c - t)$