1D Fast oscillations (Analytical)

- **Fast** oscillations: the period T is **small** compared to the other timescale(s) of the system.
- The **average** $\bar{C}$ is **positive** but $C(t)$ **can get negative values** during the period.
  If the average was negative, from the 0D analysis we expect all domains to disappear (exponentially fast in time). So we're not interested in this case.

Shape of the kink

The shape of an isolated kink, under fast oscillations, resembles the shape of the kink with $C = \bar{C}$, up to a small correction.

$$u_k(x) = u_{k_0}(x) + \epsilon u_{k_1}(x)$$

$$u(k_0)(x) = \sqrt{\frac{\bar{C}}{2}} \tanh((x - x_k)\sqrt{\bar{C}/2})$$

but with our multiple-scale analysis we couldn't fine the shape of this correction.

Kinks dynamics

Kinks dynamics is not affected by fast oscillating $C(t)$ to leading order. We find the kink dynamics for C constant and equal to $\bar{C}$.

$$\dot{x_n}(t) = 16\bar{C}^{\frac{1}{2}} \frac{[e^{-2^{\frac{1}{2}}\bar{C}^{\frac{1}{2}}l_n} - e^{-2^{\frac{1}{2}}\bar{C}^{\frac{1}{2}}l_{n+1}}]}{\int_{\chi_{n-0.5}}^{\chi_{n+0.5}} d\chi \partial_\chi u_p(\chi)}$$

that for two isolated kinks leads to a decay of the distance

$$\dot{L}(t) \simeq -24\sqrt{2}\bar{C}^{\frac{1}{2}} e^{-2^{\frac{1}{2}}\bar{C}^{\frac{1}{2}}L}$$