

0D

0 dimensions means that the order parameter is a scalar u with no space dependence. Neglecting the space dependence of $u(\mathbf{x})$ is a good approximation **deep in the bulk of a domain** (far from interfaces and close to the center of a domain).
Cancelling space derivatives in the TDGL equation

$$\partial_t u = C(t)u - u^3$$

And this equation can be solved analytically (hint: divide both sides by u^3 and then solve the homogeneous equation). The **general solution** is

$$\frac{1}{m^2(t)} = e^{-2 \int_0^t dt' C(t')} \left\{ \frac{1}{m^2(0)} + 2 \int_0^t dt' e^{2 \int_0^{t'} dt'' C(t'')} \right\}$$

If $C(t)$ is an oscillation

Let

$$C(t) = \bar{C} + b(t)$$

where $b(t)$ is a periodic function with zero average. Then

$$\int_0^t C(t') dt' = \bar{C}t + \int_0^t b(t') dt'$$

where the first term grows with t , while the second oscillates, so eventually becomes negligible. It follows that the asymptotic dynamics (when $t \rightarrow \infty$) depends only on \bar{C} as

- $\bar{C} > 0$

$$\left(\frac{1}{m^2(t)} - \frac{1}{\bar{C}} \right) \sim e^{-2\bar{C}t}$$

- $\bar{C} < 0$

$$m^2(t) \sim e^{2\bar{C}t}$$

- $\bar{C} = 0$

$$\frac{1}{m^2(t)} \sim 2 \frac{t}{n} e^{-2B(t)} \int_0^T e^{2 \int_0^{t'} dt'' b(t'')} dt'$$

the integral is a number (dependent on the period, but it's constant in time t) while the

exponential is an oscillating function. This means that, up to an oscillation

$$m(t) \sim t^{-1/2}$$

Numerical evidence

