0D dynamics

Physical meaning of 0D

If you have a 1D or 2D system and you look very close to the **center of a domain**, there the field $u(x)$ is almost constant and so you can neglect its space dependance: 0D system.
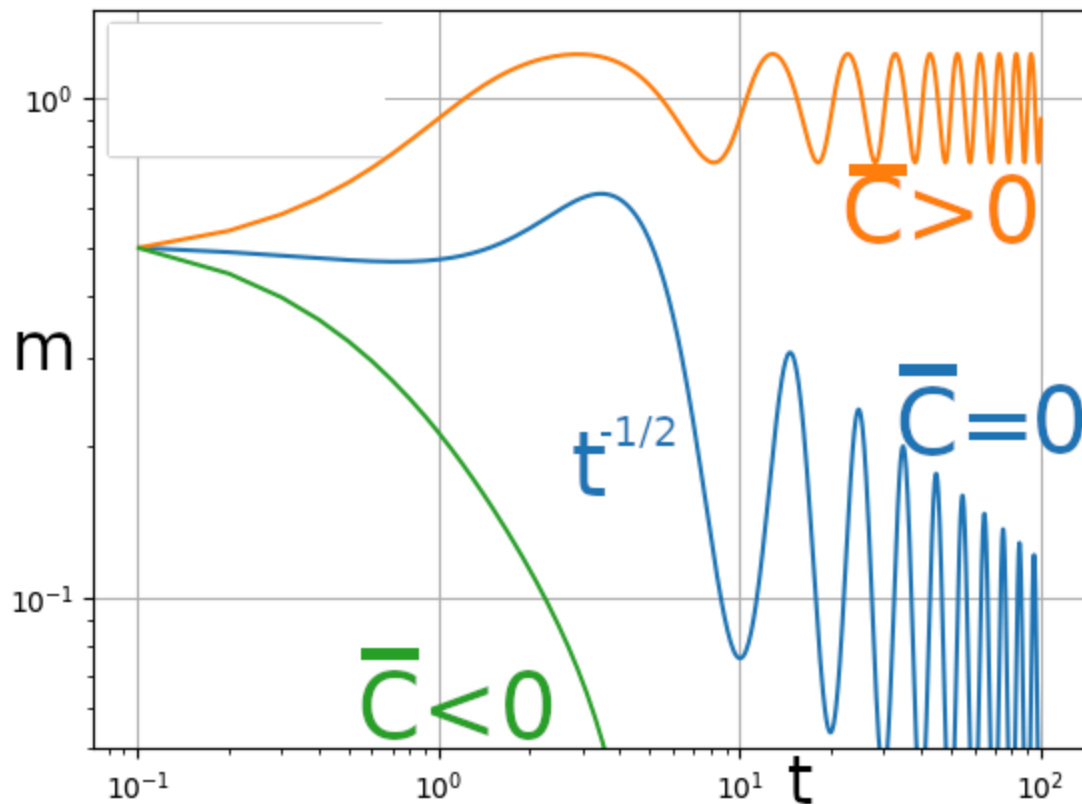
Analysis

In a 0D system, the field u is a scalar, so there are no space derivatives

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

and the equation **can be solved analytically** (see Chapter **4.1** of Master Report.pdf).
If C(t) is a **periodic oscillation** around an **average value** $\bar{C}$, then the results are summarized in this plot

(where we called m the state variable u)
If $\bar{C} \neq 0$, then u converges exponentially fast, otherwise if it is zero, the convergence is slower, as a power-law. This is known in the language of bifurcations as **critical slow down.**