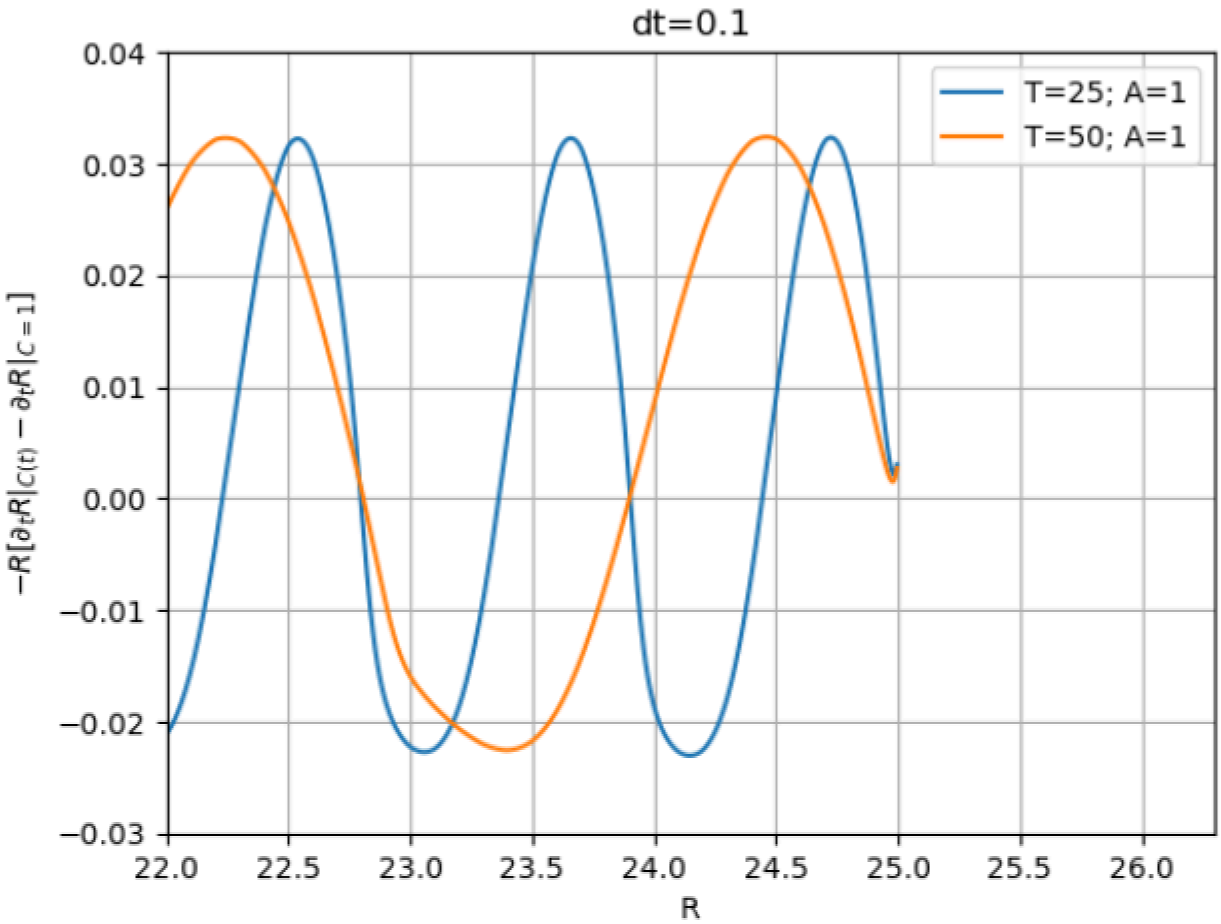
2D Slow oscillations (A<<C0) (Numerical)

Model-free analysis

Here we seek for the effect of oscillations on the dynamics of a circular domain, by **subtracting data** collected with $C = 1$ constant to data collected with $C(t) = 1 + A \sin\left(\frac{2\pi t}{T}\right)$.
We see an oscillation of this quantity. Is it a **numerical effect**?

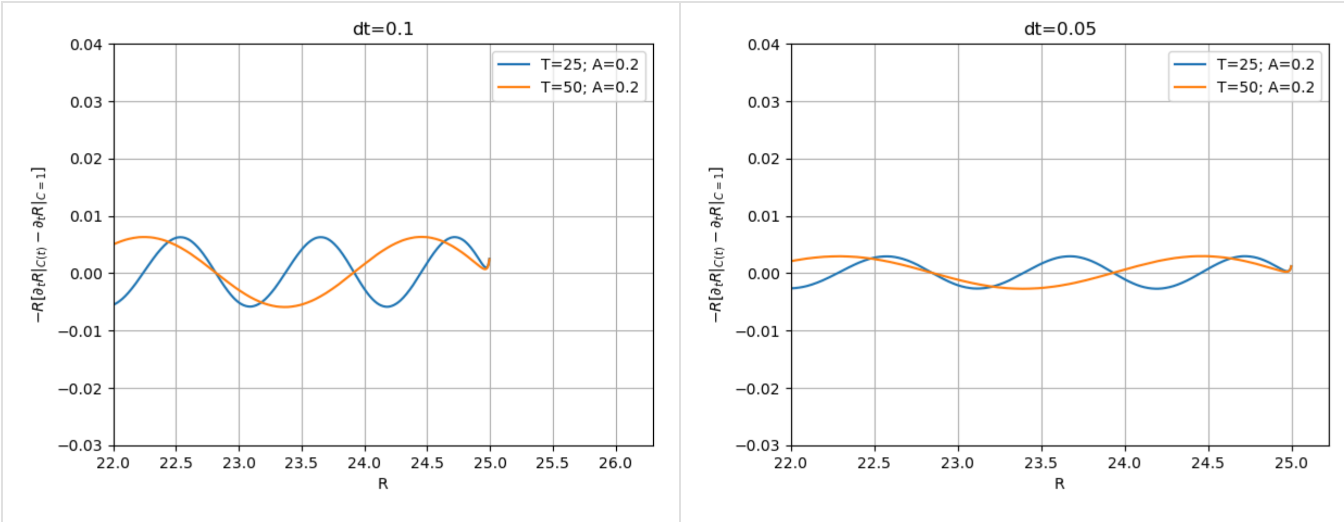


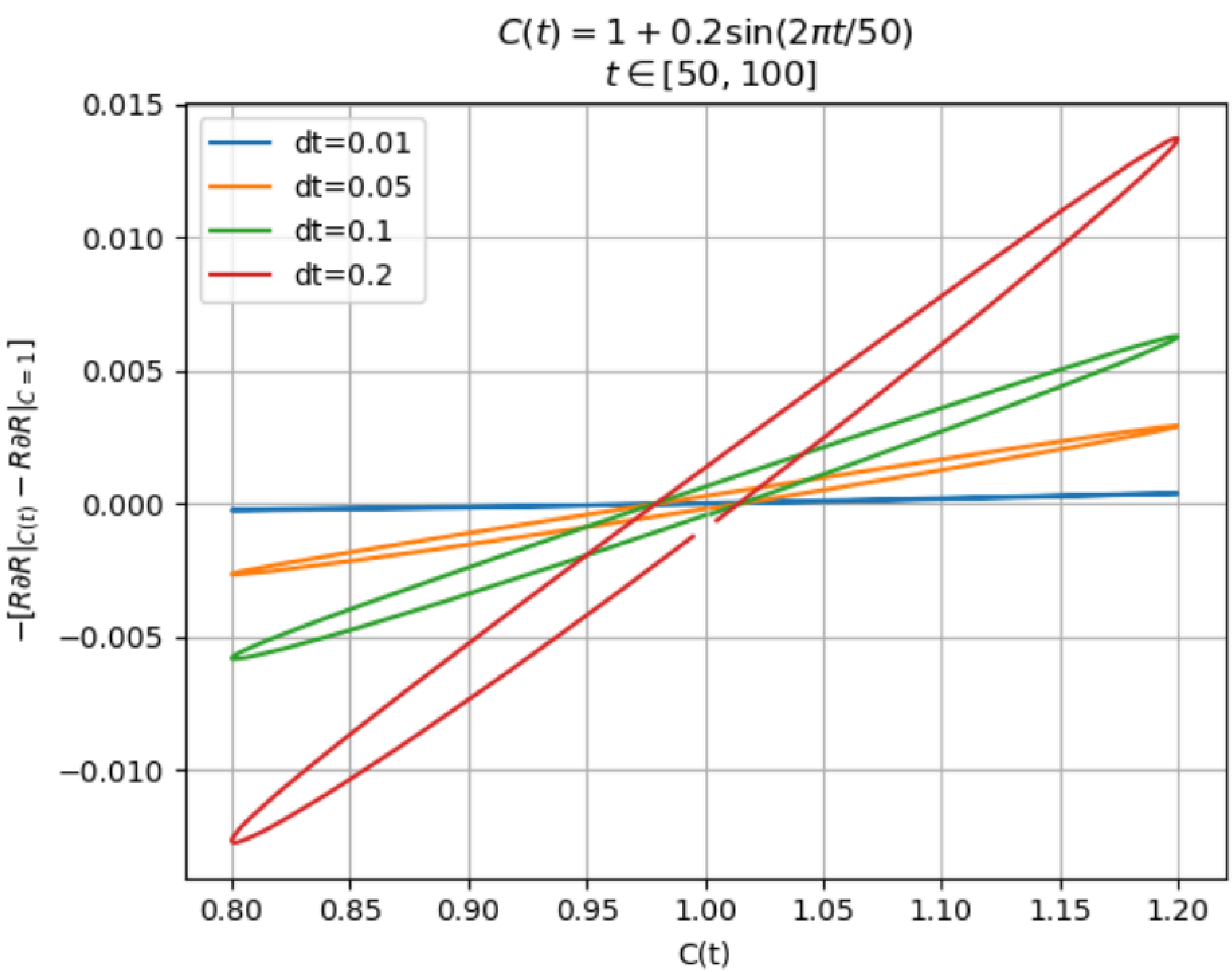
Numerical error

Oscillations in C introduce an oscillation in the deviation from the constant C curve.
We look at the difference between the curves:

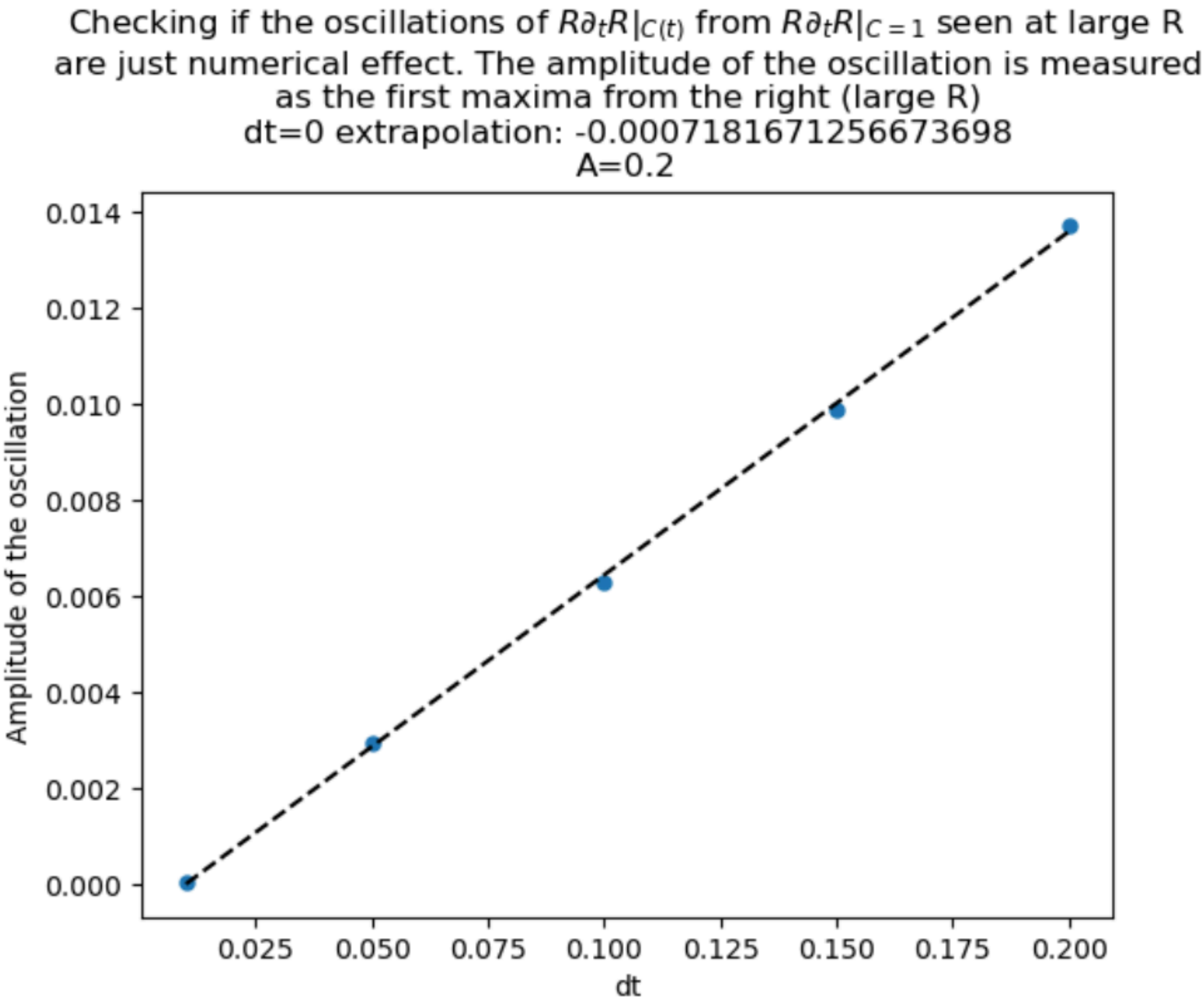
$$-[R\partial R|_{C(t)} - R\partial R|_{C=1}]$$

A=0.2





As the amplitude of the oscillation of this deviation increases with dt, we suspect it to be a numerical effect. We verify this:



The extrapolated value at $dt = 0$ is the order of magnitude of the real (non-numerical) effect. Compared to the value of $R\partial R|_{C=1}$ at large R (that is -1)

$$7 * 10^{-4} \ll 1$$

so we conclude this **is just a numerical effect** or, if there is an effect, it is 4 order of magnitude smaller than the limit value.

Conclusion

The deviation we see in simulations from the "constant C" case goes to zero when dt goes to zero, so it is just a numerical error. As a consequence, we state that slow oscillations with **small amplitude** do not affect the dynamics of a circular domain.