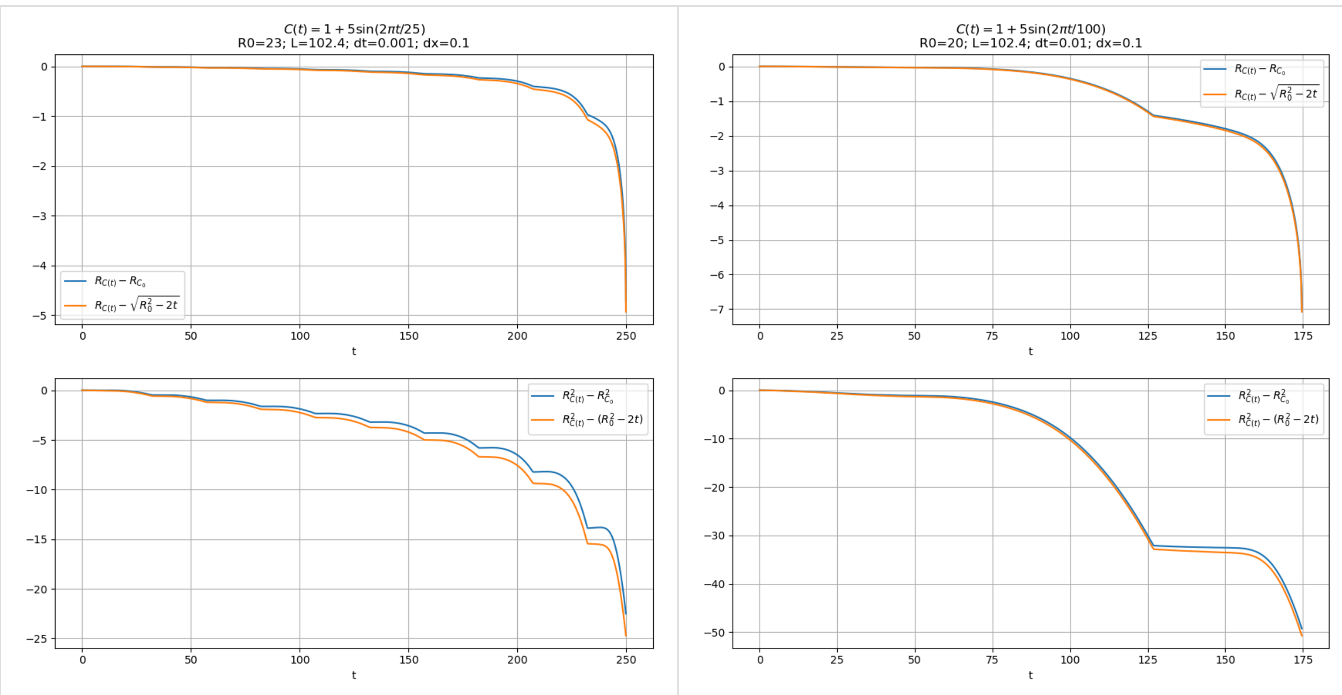
2D Slow oscillations (A>>C0) (Numerical)

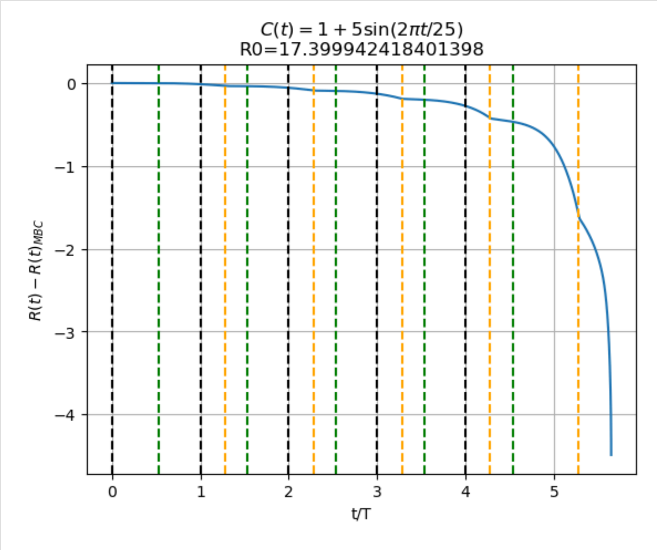
In the past

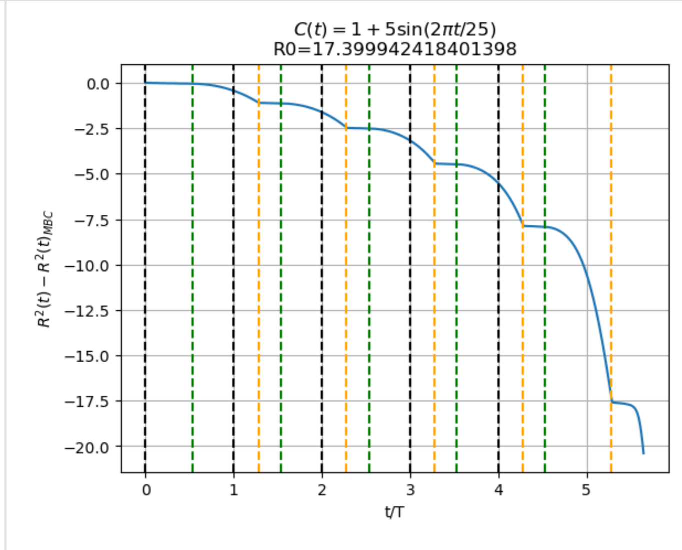
In the past we were noticing oscillations in $R(t)$ when $C(t)$ was oscillating.
Although, in the past we were estimating R of a circular island by looking at the integral of $|\nabla u|^2$
.
Now we use a more intuitive method, as we look at the $y = \frac{L}{2}$ section and we do an interpolation around the kink position. And we see steps **and NO oscillations**, like in 1D.

Steps

Over MBC, we see a step-like decay of $R(t)$. We can enhance this by **subtracting** the MBC expected decay from the measured one.



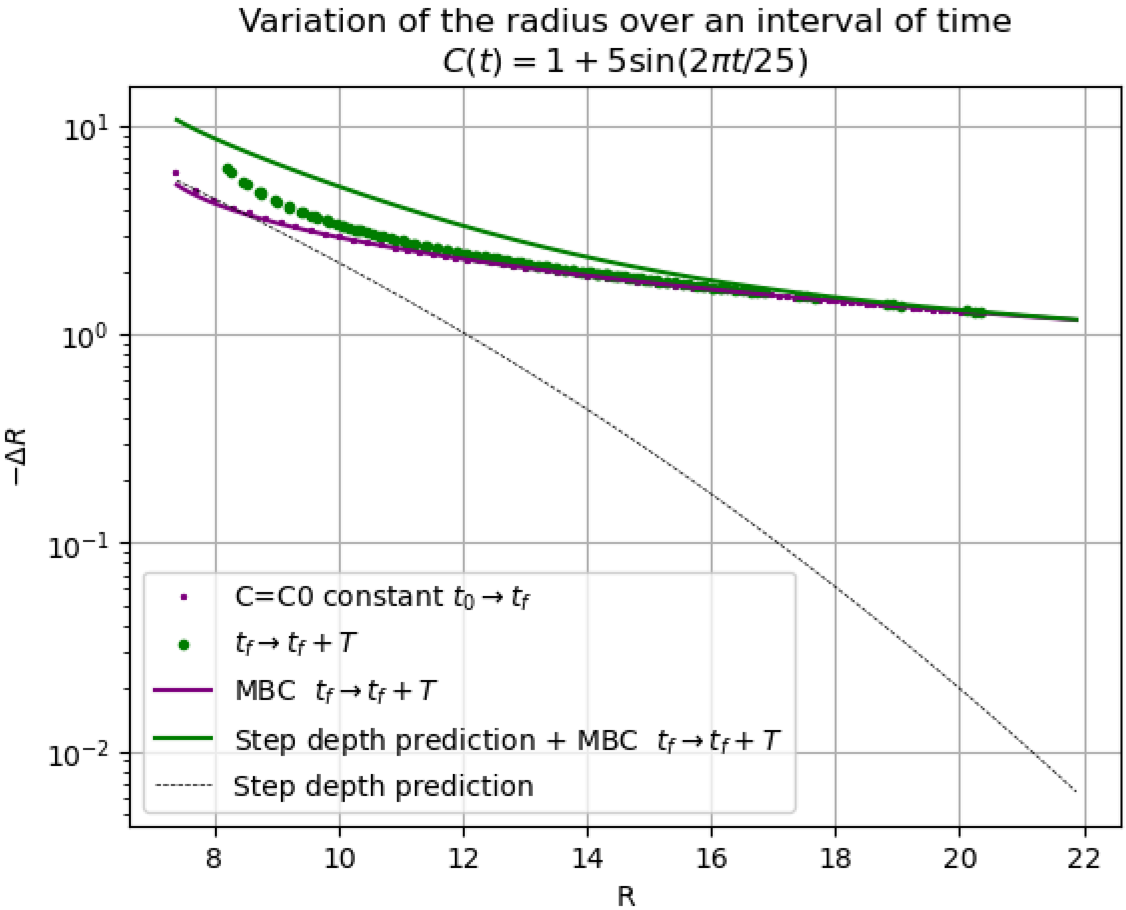




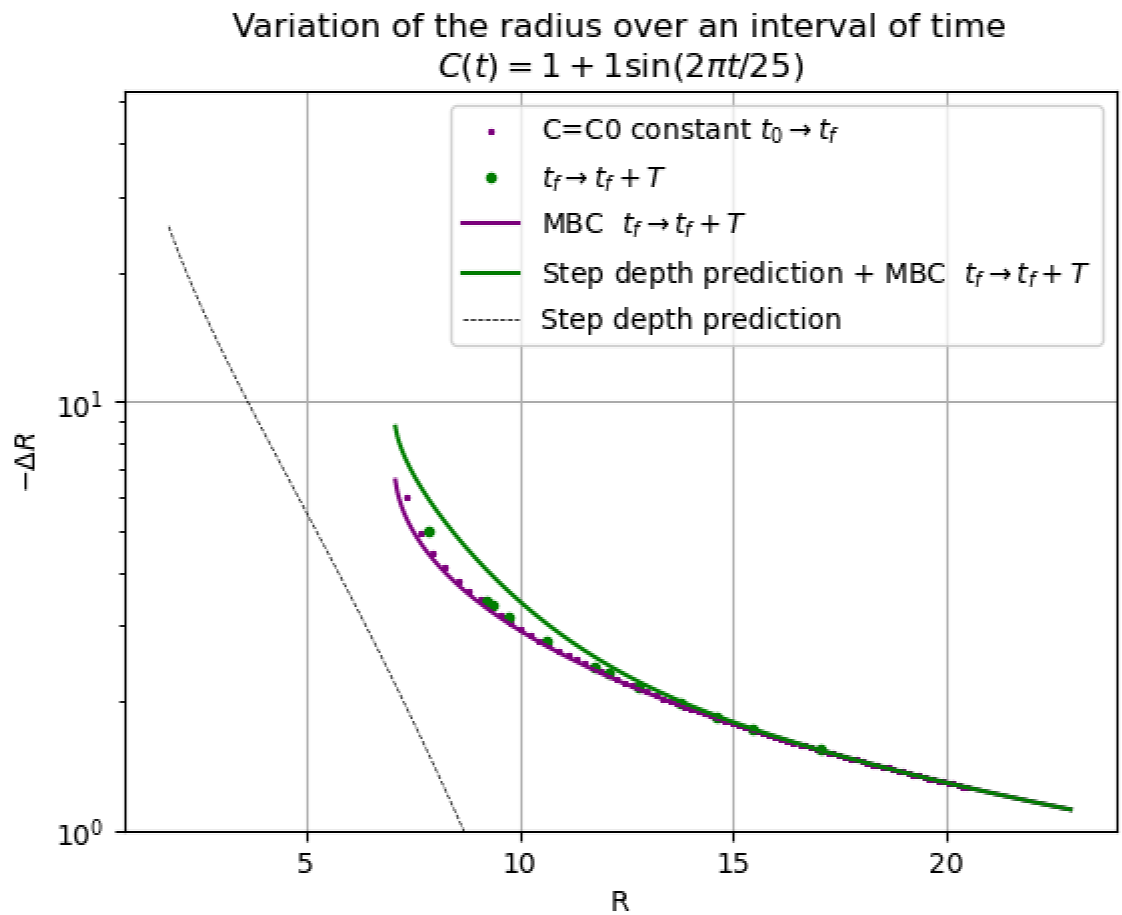
- Black : Periods $t = nT, n \in N$
- Green : Times when $C(t)$ becomes negative $t = nT + t_0$
- Orange : End of a step $t = nT + t_f$
  Where t_f and t_0 are calculated using $C(t_0) = 0; \dot{C}(t_0) < 0; \int_{t_0}^{t_f} dt' C(t') = 0$

Variation of R over a step

We can measure the variation of R from the beginning to the end of a step (between two orange lines).
The ΔR_{step} is increased by the oscillation.

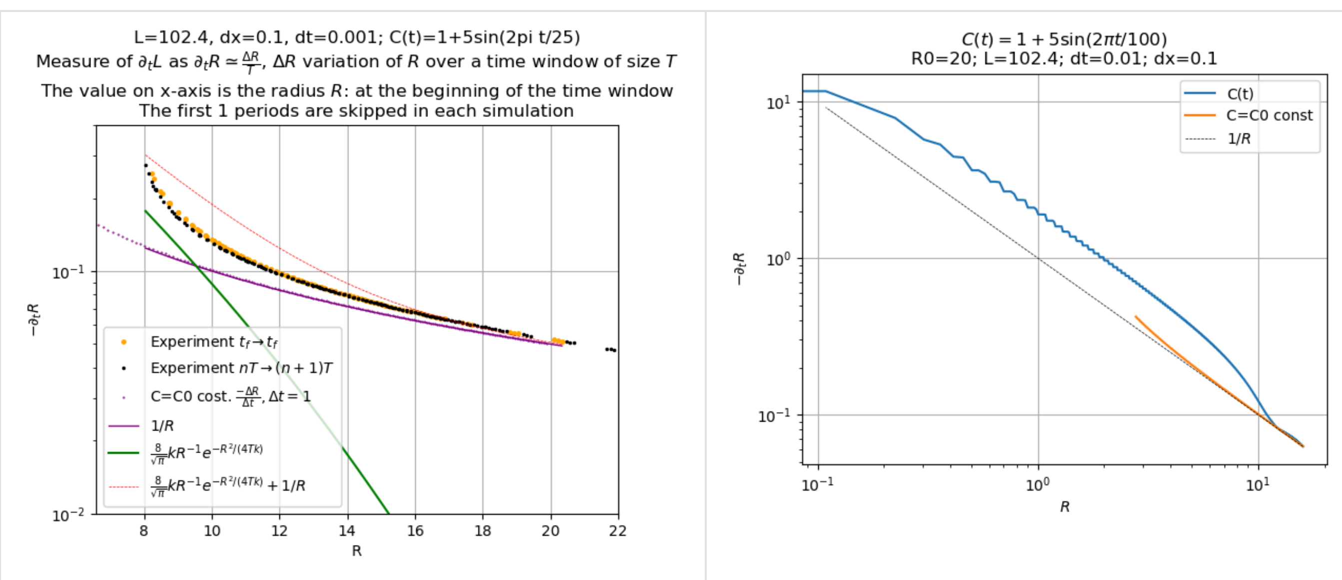


We can also measure the variation of R in the time interval where the linear approximation is expected to hold (from green to orange line). The result enhances how MBC is valid also during the linear dynamics.

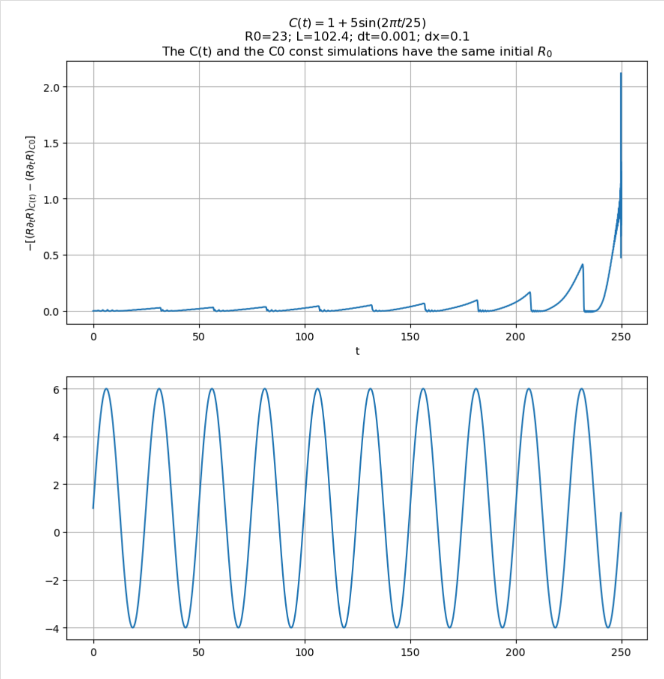


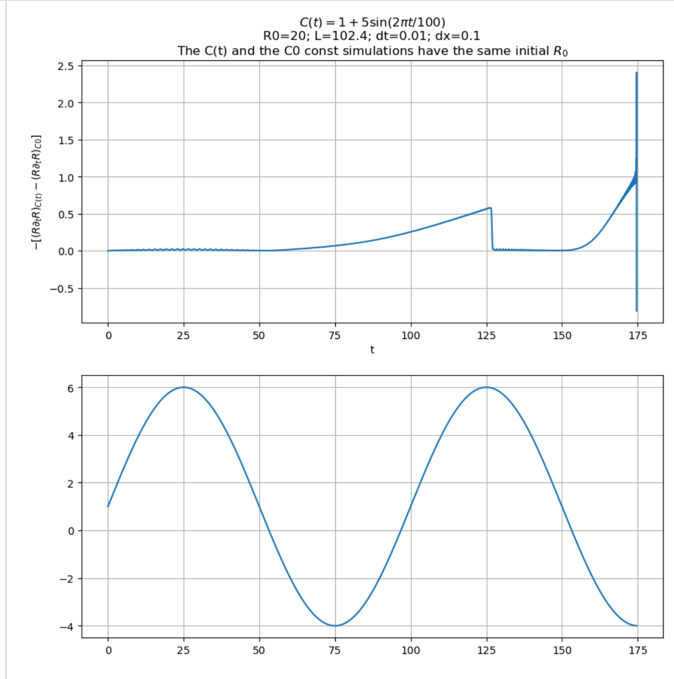
Microscopic derivative

It is defined as $\partial_t R = \frac{\delta R}{dt}$ where δR is the variation of R over the time-step dt.



Then we can consider $R\partial_t R$ that is expected to be constant if MBC is true.


$C(t) = 1 + 5\sin(2\pi t/25)$
R0=23; L=102.4; dt=0.001; dx=0.1
The C(t) and the C0 const simulations have the same initial R_0
$-[(R\partial_t R)_{C(t)} - (R\partial_t R)_{C0}]$
t


$C(t) = 1 + 5\sin(2\pi t/100)$
R0=20; L=102.4; dt=0.01; dx=0.1
The C(t) and the C0 const simulations have the same initial R_0
$-[(R\partial_t R)_{C(t)} - (R\partial_t R)_{C0}]$
t