# Contents



# 1 05/25/21

TODO Fill in the calculation of the inclination.

We start with the solution for the inner orbit's inclination

$$\mathcal{I}(t) = Ae^{ig_I t} + Be^{ig_{II} t}, \tag{1}$$

where $A$ and $B$ are generally complex ($A$ can be chosen to be real by choosing the initial phase). If we seek a CS with the frequency $g_I$, then we can go to the corotating frame, in which case

$$\mathcal{I}_{\mathrm{rot}}(t) = I_0 + Be^{i(g_{II} - g_I)t}. \tag{2}$$

With appropriate choice of initial time/phase, $B$ can be chosen to be real as well. Define $g' = g_{II} - g_I$. Intuitively, there are four cases near CS2:

- If $I_0 > B$ and $g' \gg \omega_{\mathrm{lib}}$, we should see small oscillations about CS2 (as $\hat{\mathbf{I}}_{\mathrm{p}}$ effectively is "vibrating"), which average out.
- If $I_0 > B$ and $g' \ll \omega_{\mathrm{lib}}$, then adiabatic resonance advection means that the trajectory should encircle CS2 with constant phase space area as CS2 moves around slightly.
- If $I_0 < B$ and $g' \gg \omega_{\mathrm{lib}}$, note that $\hat{\mathbf{I}}_{\mathrm{p}}$ is *circulating*; probably precesses about average.
- If $I_0 < B$ and $g' \ll \omega_{\mathrm{lib}}$, then there should be no resonance, as CS2 itself is circulating; there is no librating resonant angle.