Driven oscillator (ctd.)

Guess: \( z = Ce^{i\omega t} \)

\[ \Rightarrow \text{Guess works, if} \]

1) \( \omega = \omega_d \)

2) \[ C(-\omega_d^2 + \omega_d^2 + \omega_0^2) = \frac{F_0}{m} \]

Both the real & mag. parts of \( C \) can be determined by the above eqn \( \Rightarrow \) no dependence on initial condition \( \Rightarrow \) this is the "steady state soln", i.e. the behavior at times \( \gg T \), where the effect of the initial conditions has worn off.

\[ \Rightarrow \text{In the steady state, the response is at the same freq. as the drive!} \]

To find \( C \) : set \( C = A e^{-i\delta} \Rightarrow z = Ae^{-i\delta} e^{i\omega t} \)

\[ A = \frac{F_0/m}{\sqrt{(\omega_0^2 - \omega_d^2)^2 + \delta^2 \omega_d^2}} \]