General solution to $mx'' + kx = F_0 \cos \omega t \quad (\omega \neq \omega_0)$ is

$$x(t) = c_1 \sin \omega_0 t + c_2 \cos \omega_0 t + \frac{F_0/m}{\omega_0^2 - \omega^2} \cos \omega t$$

$$\text{or} \quad x(t) = C \cos(\omega_0 t - \alpha) + \frac{F_0/m}{\omega_0^2 - \omega^2} \cos \omega t$$

Thus the solution will be a combination of sinusoids at <u>different frequencies</u>. This leads to the phenomenon of <u>beats</u>.