$$M'(\gamma) = -\frac{1}{2}\,\frac{1}{\left((k-m\gamma^2)^2 + b^2\gamma^2\right)^{3/2}} \times \left\{ 2(k-m\gamma^2)(-2\gamma m) + 2b^2\gamma \right\}$$

$$= \frac{-\gamma}{(\ )^{3/2}} \left\{ -2(k-m\gamma^2)m + b^2 \right\}$$

$$= \frac{-\gamma}{(\ )^{3/2}} \left\{ 2m^2\gamma^2 + b^2 - 2km \right\} = 0$$

when $\gamma = 0$ or $2m^2\gamma^2 = 2km - b^2$

$$\gamma^2 = \frac{2km - b^2}{2m^2} = \frac{k}{m} - \frac{b^2}{2m^2}$$

$$\gamma = \sqrt{\frac{k}{m} - \frac{b^2}{2m^2}}$$

NOTE: ~~For an underdamped case $b^2 < 4mk$~~

$M(\gamma)$ has maximum if $b^2 < 2km$.

In this case $b^2 < 2km \le 4mk$ and the system is underdamped. In this case,

$$\frac{1}{2\pi}\gamma_r = \frac{1}{2\pi}\sqrt{\frac{k}{m} - \frac{b^2}{2m^2}}$$ is called

the resonance frequency and the system is said to be at resonance.