

This equation has a steady state solution of the form

$$\theta = A \sin \Omega t . \quad \text{Putting this in } \Rightarrow$$

$$(-\Omega^2 + \omega^2) A = \frac{\Omega^2 A}{a} , \quad \text{or } A = \frac{\Omega^2}{\omega^2 - \Omega^2} \cdot \frac{1}{a} . \quad \text{Put this}$$

result back into the expression for  $Z_M \Rightarrow$

$$Z_M = 1 \sin \Omega t + a A \sin \Omega t = \left( 1 + \frac{1}{\omega^2 - \Omega^2} \right) \sin \Omega t , \quad \text{or}$$

$$Z_M = 1 \left( \frac{\omega^2}{\omega^2 - \Omega^2} \right) \sin \Omega t . \quad \text{But } Z_c = 1 \sin \Omega t .$$

$$\therefore \frac{Z_M}{Z_c} = \frac{\omega^2}{\omega^2 - \Omega^2}$$

