$$m y_p'' + b y_p' + k y_p$$
$$= -m\gamma^2 A_1 \cos\gamma t - m\gamma^2 A_2 \sin\gamma t$$
$$- b\gamma A_1 \sin\gamma t + b\gamma A_2 \cos\gamma t$$
$$+ k A_1 \cos\gamma t + k A_2 \sin\gamma t$$
$$= \cos\gamma t \left[A_1 (k - m\gamma^2) + b\gamma A_2 \right]$$
$$+ \sin\gamma t \left[A_2 (k - m\gamma^2) - b\gamma A_1 \right]$$
$$= F_0 \cos\gamma t + 0 \sin\gamma t$$

We require
$$A_1 (k - m\gamma^2) + b\gamma A_2 = F_0$$
$$A_2 (k - m\gamma^2) - b\gamma A_1 = 0$$

$$A_1 (k - m\gamma^2)^2 + b\gamma (k - m\gamma^2) A_2 = F_0 (k - m\gamma^2)$$
$$A_2 (k - m\gamma^2) b\gamma - b^2\gamma^2 A_1 = 0$$
$$A_1 \left[(k - m\gamma^2)^2 + b^2\gamma^2 \right] = F_0 (k - m\gamma^2)$$
$$A_1 = \frac{F_0 (k - m\gamma^2)}{(k - m\gamma^2)^2 + b^2\gamma^2}$$

and we find
$$A_2 = \frac{F_0 b\gamma}{(k - m\gamma^2)^2 + b^2\gamma^2}$$

and
$$y_p = \frac{F_0}{(k - m\gamma^2)^2 + b^2\gamma^2} \left\{ (k - m\gamma^2) \cos\gamma t + b\gamma \sin\gamma t \right\}$$
$$= \frac{F_0}{(k - m\gamma^2)^2 + b^2\gamma^2} \sqrt{(k - m\gamma^2)^2 + b^2\gamma^2} \sin(\gamma t + \theta)$$
for some θ

$$y_p = \frac{F_0}{\sqrt{(k - m\gamma^2)^2 + b^2\gamma^2}} \sin(\gamma t + \theta)$$

$\tan\theta = \frac{A_1}{A_2} = \frac{k - m\gamma^2}{b\gamma}$