$$= C + 0 + 0 + \frac{1}{2}\cdot\varepsilon J(\theta-\theta_g)^2 + \frac{1}{2}\cdot\frac{\varepsilon}{4}(J-J_g)^2 + 0$$

$$= \frac{\varepsilon(1-\nu)}{2}(\theta-\theta_g)^2 + \frac{\varepsilon}{8}(J-J_g)^2$$

This has the form of the linear oscillator. ∴ This fixed point is stable.

It was shown in part a) that if $-\frac{\varepsilon}{4} < 1-\frac{\Omega}{2} < \frac{\varepsilon}{4}$, then there is a resonance at $\Omega = 2$

$$\frac{\varepsilon\nu}{4} = 1-\frac{\Omega}{2} \Rightarrow \frac{\varepsilon}{4} = \frac{1}{\nu}\left(1-\frac{\Omega}{2}\right)$$

$$-\frac{1}{\nu}\left(1-\frac{\Omega}{2}\right) < 1-\frac{\Omega}{2} < \frac{1}{\nu}\left(1-\frac{\Omega}{2}\right)$$

$$-\frac{1}{\nu} < 1 < \frac{1}{\nu}$$

$$-1 < \nu < 1$$

which is the stated condition on ν.

✓

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