

$$+ \frac{QJ}{16\pi} \left( \frac{-4}{\Omega} (\cos(2t+\pi) - \cos(2t-\pi)) \right. \\ \left. - \frac{J}{2\Omega} (\sin(4d+2\Omega t+2\pi) - \sin(4d+2\Omega t-2\pi)) \right. \\ \left. + \frac{1}{\Omega} (\cos(2d+2\Omega t+2\pi) - \cos(2d+2\Omega t-2\pi)) \right)$$

$$= J + \frac{EJ^2}{8} + \frac{EJ}{4} \sin 2d - \frac{QJ}{2} \\ + \frac{QJ}{16\pi} \left( \frac{-4}{\Omega} (-\cos 2t - \cos 2t) - \frac{J}{2\Omega} \cdot 0 \right. \\ \left. + \frac{1}{\Omega} (\cos(2d+2\Omega t) - \cos(2d+2\Omega t)) \right) \\ = J + \frac{EJ^2}{8} + \frac{EJ}{4} \sin 2d - \frac{QJ}{2} \quad \checkmark$$

$$\text{ie } \bar{K}(d, J) = J + \frac{EJ^2}{8} + \frac{EJ}{4} \sin 2d - \frac{QJ}{2} \\ = \frac{E}{4} \left( \frac{4}{E} \left( J - \frac{QJ}{2} \right) + J \sin 2d + \frac{J^2}{2} \right) \\ = \frac{E}{4} \left( \frac{4}{E} \left( 1 - \frac{Q}{2} \right) J + J \sin 2d + \frac{J^2}{2} \right) \\ = \frac{E}{4} \left( \left( \frac{4}{E} \left( 1 - \frac{Q}{2} \right) + \sin 2d \right) J + \frac{J^2}{2} \right)$$

$$\text{Put } \frac{EY}{4} = 1 - \frac{Q}{2} \quad \checkmark \\ Y = \frac{4}{E} \left( 1 - \frac{Q}{2} \right)$$

$$\text{Then } \bar{K}(d, J) = \frac{E}{4} \left( (Y + \sin 2d) J + \frac{J^2}{2} \right)$$

$$\dot{d} = \frac{\partial \bar{K}}{\partial J} = \frac{E}{4} \frac{\partial}{\partial J} \left( (Y + \sin 2d) J + \frac{J^2}{2} \right) \\ = \frac{E}{4} (Y + \sin 2d + J) \quad \checkmark$$

$$\dot{J} = -\frac{\partial \bar{K}}{\partial d} = -\frac{E}{4} \frac{\partial}{\partial d} \left( (Y + \sin 2d) J + \frac{J^2}{2} \right) \\ = -\frac{E}{4} \cdot 2J \cos 2d = -\frac{EJ}{2} \cos 2d \quad \checkmark$$

At the fixed points  $\dot{d} = \dot{J} = 0$

9/10