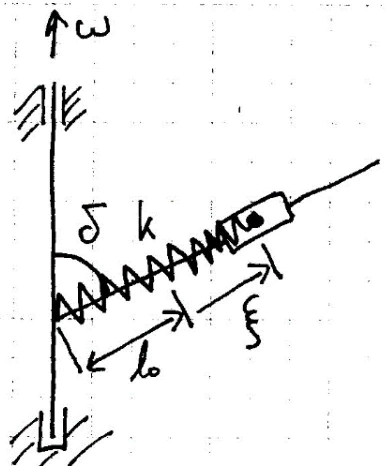

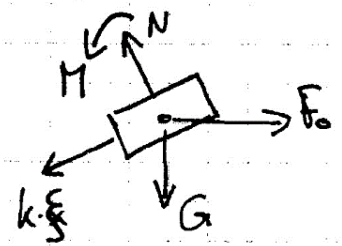

$$F_o = m\cdot r\cdot\omega^2 = m\cdot(l_0+\xi)\sin\delta\cdot\omega^2$$

$$m\ddot{\xi} = -k\xi - mg\cos\delta + F_o\cdot\sin\delta = -k\xi - mg\cos\delta + m(l_0+\xi)\sin^2\delta\,\omega^2$$

$$m\ddot{\xi} + (k - m\cdot\sin^2\delta\cdot\omega^2)\,\xi = m l_0 \sin^2\delta\,\omega^2 - mg\cos\delta$$

Stabilita: (složité)

$$z_1 = \xi \;\rightarrow\; \dot z_1 = z_2$$
$$z_2 = \dot\xi \qquad \dot z_2 = (l_0+z_1)\sin^2\delta\,\omega^2 - \frac{k}{m}z_1 - g\cdot\cos\delta$$

$$\underline{\dot z} = \underline{A}\,\underline{z} + \underline{f}$$

$$\begin{bmatrix}\dot z_1\\ \dot z_2\end{bmatrix} = \begin{bmatrix}0 & 1\\ -\frac{k}{m}+\sin^2\delta\,\omega^2 & 0\end{bmatrix}\begin{bmatrix}z_1\\ z_2\end{bmatrix} + \begin{bmatrix}0\\ -g\cdot\cos\delta\end{bmatrix}$$

$$\det|A-\lambda E| = 0 \qquad \begin{vmatrix}-\lambda & 1\\ -\frac{k}{m}+\sin^2\delta\,\omega^2 & -\lambda\end{vmatrix} \overset{!}{=} 0$$

$$\lambda^2 - \left(\sin^2\delta\,\omega^2 - \frac{k}{m}\right) = 0 \Rightarrow \lambda_{1,2} = \pm\sqrt{\sin^2\delta\cdot\omega^2 - \frac{k}{m}} \quad \%$$

$Re(\lambda_i) < 0 \rightarrow$ asymptoticky stabilní

$\rightarrow$ mez stability:

$$\sin^2\delta\cdot\omega_s^2 = \frac{k}{m}$$
$$\omega_s = \sqrt{\frac{k}{m}\cdot\frac{1}{\sin^2\delta}}$$

pro $\omega > \omega_s$ je to nestabilní

Stabilita jednoduše:

$$m\ddot\xi + (k - m\cdot\sin^2\delta\cdot\omega^2)\,\xi = \dots\dots$$

pro $(k - m\cdot\sin^2\delta\cdot\omega^2) < 0$ je to nestabilní (záporná tuhost)

$\rightarrow$ mez stability $\omega_s = \sqrt{\frac{k}{m\cdot\sin^2\delta}}$