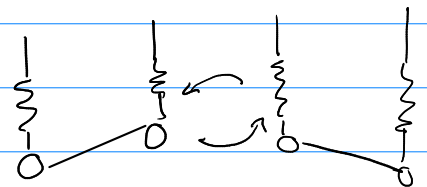$$M = \begin{pmatrix} 2 & & \\ & 2 & \\ & & \frac{L^2}{2} \end{pmatrix} \qquad V = \begin{pmatrix} 0 & & \\ & 2 & \\ & & -\frac{L^2}{2} \end{pmatrix}$$
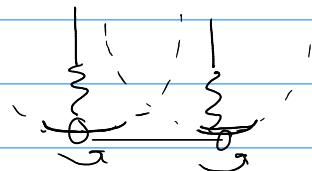
$$V - \lambda M = \begin{pmatrix} -2\lambda & & \\ & 2-2\lambda & \\ & & \frac{L^2}{2}(-1-\lambda) \end{pmatrix}$$

$\lambda = -1, 0, +1$

$\lambda = -1 \longrightarrow \begin{pmatrix} 0 \\ 0 \\ \frac{L^2}{2} \end{pmatrix}$



$\lambda = 0 \longrightarrow \begin{pmatrix} 1 \\ 0 \\ 0 \end{pmatrix}$



$\lambda = +1 \longrightarrow \begin{pmatrix} 0 \\ 1 \\ 0 \end{pmatrix}$