Lecture # 14 10-8-2004

$$L = \frac{1}{2}\sum m_{ij}\dot{x}_i\dot{x}_j - k_{ij}x_i x_j$$

$$x_i = A_i e^{i\omega t}$$

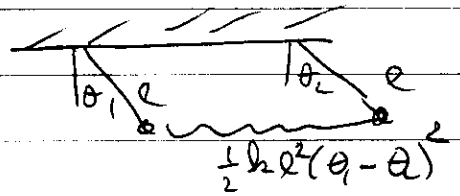
$$(-\omega^2 m_{ij} - k_{ij})A_j = 0$$

$$\sum_{ij} m_{ij} A_j^{(\alpha)} A_j^{(\beta)} = \delta_{\alpha\beta}$$

$$x_j = \sum_\alpha A_j^{(\alpha)} Q_\alpha$$

Q_α ← normal mode

$$L = \sum_\alpha \left(\frac{1}{2}\dot{Q}_\alpha^*\dot{Q}_\alpha - \frac{1}{2}\omega_\alpha^2 Q_\alpha^* Q_\alpha\right)$$



$$k\ell = \begin{pmatrix} 1+\alpha & -\alpha \\ -\alpha & 1+\alpha \end{pmatrix}$$

$$\omega_1^2 = 1 \qquad \omega_2^2 = 1+2\alpha$$

$$A^{(1)} = \frac{1}{\sqrt{2}}\begin{pmatrix}1\\1\end{pmatrix} \qquad A^{(2)} = \frac{1}{\sqrt{2}}\begin{pmatrix}1\\-1\end{pmatrix}$$

Today V c) Zero modes

V d) Parametric resonance