KAP 5: Bevegelseslign. for stive legemer

- $\vec{L} = \overleftrightarrow{I}\,\vec{\omega}$; $I_{jk} = \int_V \rho(\vec{r})\,(r^2\delta_{jk} - x_j x_k)\,dV$

- $T = \frac{1}{2} I \omega^2$; $I = \vec{n}\,\overleftrightarrow{I}\,\vec{n}$

- Hovedakser x_1, x_2, x_3 $\Rightarrow \overleftrightarrow{I} = \begin{pmatrix} I_1 & 0 & 0 \\ 0 & I_2 & 0 \\ 0 & 0 & I_3 \end{pmatrix} \Rightarrow$ $L_i = I_i \omega_i$, $T = \sum_j \frac{1}{2} I_j \omega_j^2$

- Eulerligningane: $\frac{d\vec{L}}{dt} + \vec{\omega} \times \vec{L} = \vec{N}$ (sett fra roterende system)

- Fri rotasjon - presesjon ; Gyroskopeffekt ; Snurrebass

KAP 6: Små oscillasjoner

- små utsving fra stabil likevekt $\Rightarrow V \approx \frac{1}{2}\left(\frac{\partial^2 V}{\partial q_i \partial q_j}\right)_0 \eta_i \eta_j = \frac{1}{2} V_{ij}\,\eta_i \eta_j$
- kin. energi : $T = \frac{1}{2} m_{ij}\,\dot{\eta}_i \dot{\eta}_j = \frac{1}{2} T_{ij}\,\dot{\eta}_i \dot{\eta}_j$
- $L = T - V$; $\frac{d}{dt}\frac{\partial L}{\partial \dot{\eta}_i} - \frac{\partial L}{\partial \eta_i} = 0 \Rightarrow T_{ij}\,\ddot{\eta}_j + V_{ij}\,\eta_j = 0$

- $\eta_i = A_i e^{-i\omega t} \Rightarrow \underbrace{\det(\mathbb{V} - \omega^2\,\mathbb{T}) = 0}_{\text{sekulær ligning}} \Rightarrow$ egenfrekvenser ω_α

- $A_{i\alpha} \sim \Delta_{i\alpha} \sim (i,\alpha)$-minoren til $|\mathbb{V} - \omega_\alpha^2\,\mathbb{T}|$

- $\mathrm{Re}\,\eta_i = \sum_\alpha \mathrm{Re}\,\eta_{i\alpha} = \mathrm{Re}\sum_\alpha C_\alpha \Delta_{i\alpha} e^{-i\omega_\alpha t} = \sum_\alpha \Delta_{i\alpha}\,\Theta_\alpha(t)$

$$\Rightarrow \ldots\ldots \Rightarrow \ddot{\Theta}_\alpha + \omega_\alpha^2\,\Theta_\alpha = 0 \quad \text{(dekoblet!)}$$

Normalkoordinater

- Systemet oscillerer i <u>normalmode</u> α med <u>egenfrekvens</u> ω_α