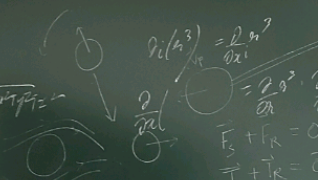


$$\begin{aligned}
& \frac{\partial}{\partial x^i} = \frac{\partial}{\partial x^i} \frac{\partial}{\partial x^j} \frac{\partial}{\partial x^k} \\
& \vec{E}_s + \vec{E}_K = 0 \\
& \vec{T}_s + \vec{T}_K = 0 \\
& (\vec{u}^{(p)} + \Delta \vec{u}^{(f)}) = \vec{V}_p + \frac{\eta_i \eta_j}{8\pi\eta} \partial_i \partial_j \left[\frac{n_K}{n_K} + \frac{1}{a^3 |n|} \eta_p \eta_p \eta_K \right] = \left(\frac{\eta_i \eta_j}{8\pi\eta |n|} \right) \eta_K \partial_i \partial_j \left(\frac{1}{a} \right) + \frac{\eta_i \eta_j \eta_p}{8\pi\eta |n|} \partial_i \partial_j \left(\frac{\eta_p \eta_K}{a^3} \right) \\
& (\vec{V}_p^{(f)} + \vec{\Omega}_p \times (\vec{r} - \vec{r}_p)) = \vec{V}_p + \frac{\eta_i \eta_j}{8\pi\eta} \partial_i \partial_j \left[\frac{n_K}{n_K} + \frac{1}{a^3 |n|} \eta_p \eta_p \eta_K \right] \\
& (\vec{V}_p - \vec{V}_p^{(f)}) + (\vec{\Omega}_p - \vec{\Omega}_p^{(f)}) = \vec{V}_p - \vec{V}_p^{(f)} + \frac{\eta_i \eta_j}{8\pi\eta} \partial_i \partial_j \left[\frac{n_K}{n_K} + \frac{1}{a^3 |n|} \eta_p \eta_p \eta_K \right] \\
& \partial_i \left[\partial_j \left(\frac{\eta_p \eta_K}{a^3} \right) \right] = \partial_i \left[\frac{\eta_p \eta_K \partial_j (a^3)}{a^6} + a^3 \partial_j (\eta_p \eta_K) \right] = \partial_i \left[\frac{a^3 (\delta_{jp} \eta_K + \delta_{jK} \eta_p) - 3 \eta_p \eta_K a_j}{a^6} \right] \\
& = \partial_i \left[\frac{\delta_{jp} \eta_K}{a^3} \right] + \partial_i \left[\frac{\delta_{jK} \eta_p}{a^3} \right] - 3 \partial_i \left[\frac{\eta_p \eta_K a_j}{a^5} \right] \\
& \text{Look at } (\vec{n} \cdot \vec{V})^r = n_i \partial_i \eta_j \partial_j = n_i \eta_j \partial_i \partial_j \\
& \frac{1}{r} (a) = -\frac{1}{a^2} \nabla^2 \pi(a) \\
& = \frac{1}{8\pi\eta a^3} \left[-\vec{I} + \frac{3\eta_i \partial_i a}{a^2} \right] \\
& H(a, n) = \frac{1}{8\pi\eta a^3} \left[-1 + \frac{3(\vec{n} \cdot \vec{a})^2}{|\vec{n}|^2 |\vec{a}|^2} \right] \vec{I} \\
& T(r) = \frac{1}{8\pi\eta} \frac{1}{r} \left[\vec{I} + \frac{\eta_i \partial_i}{r^2} \right] \\
& \frac{1}{r^2} \rightarrow \frac{1}{a^2} \rightarrow \frac{1}{r^3} \rightarrow \frac{1}{a^3} \\
& \frac{\partial}{\partial t} (u v^{(f)}) = \eta \vec{V}^{(f)} - \vec{V}^{(f)2}
\end{aligned}$$

$\frac{\partial}{\partial a} \sqrt{r^2 + p^2} = \dots$

 $\frac{\partial}{\partial a} \left(\frac{4}{3} \pi r^3 \right) = \frac{\partial}{\partial a} \left(\frac{4}{3} \pi a^3 \right) = 4 \pi a^2 \cdot \frac{\partial a}{\partial a} = 4 \pi a^2$
 $\vec{F}_s + \vec{F}_K = \vec{0}$
 $\vec{T}_s + \vec{T}_K = \vec{0}$

$\theta = \frac{\omega}{T}$
 $\omega = T \theta$

$\frac{\partial \vec{a}}{\partial t} = \frac{\partial \vec{a}}{\partial r} \frac{\partial r}{\partial t}$
 $= \frac{\partial \vec{a}}{\partial r} \frac{r}{a}$

$\vec{u}_s + \Delta \vec{u}_s + (\vec{u}_s^T \cdot \nabla) \vec{u}_s = \vec{V}_p + \frac{\eta_i \eta_j}{8 \pi \eta} \partial_i \partial_j \left[\frac{n_k}{|n|} + \frac{1}{a^3 |n|} n_p n_p n_k \right] = \left(\frac{\eta_i \eta_j}{8 \pi \eta |n|} \right) n_k \partial_i \partial_j \left(\frac{1}{a} \right) + \frac{\eta_i \eta_j \eta_p}{8 \pi \eta |n|} \partial_i \partial_j \left(\frac{n_p n_k}{a^3} \right)$
 $\Rightarrow \vec{u}_s + \Delta \vec{u}_s = (\vec{V}_p - \vec{V}^H) + \left(\frac{1}{a} - \frac{1}{a^3} \right) \vec{n}$
 $a = \sqrt{b^2 + r^2 + R^2}$

$\partial_p \left[\frac{n_p n_k}{a^4} - \frac{3 n_p n_k n_i}{a^6} \right] + \partial_j \left[\frac{n_j n_k}{a^4} - \frac{3 n_j n_k n_i}{a^6} \right] - 3 \left[\frac{n_i (\delta_{ip} n_k n_j + \delta_{ik} n_p n_j + \delta_{ij} n_p n_k)}{a^{10}} - \frac{5 n_i n_p n_k n_j}{a^{12}} \right]$
 $= \left[\frac{\delta_{ip} \partial_k}{a^4} - \frac{3 \delta_{ip} n_i n_k}{a^6} \right] + \left[\frac{\delta_{jk} \partial_p}{a^4} - \frac{3 \delta_{jk} n_j n_p}{a^6} \right] - \frac{3}{a^4} \left[\delta_{ip} n_k n_j + \delta_{ik} n_p n_j + \delta_{ij} n_p n_k \right] + \frac{15}{a^6} n_i n_p n_k n_j$
Look at: $(\vec{n} \cdot \vec{\nabla})^2 = n_i \partial_i n_j \partial_j = n_i n_j \partial_i \partial_j$
 $\partial_i \left[\frac{n_j n_k}{a^3} \right] = \partial_i \left[\frac{n_j n_k}{a^3} \right] + a^3 \partial_j (n_p n_k) = \partial_i \left[\frac{\delta_{jp} n_k + \delta_{jk} n_p}{a^3} - 3 n_i n_p n_k n_j \right]$
 $= \partial_i \left[\frac{\delta_{jp} n_k}{a^3} \right] + \partial_i \left[\frac{\delta_{jk} n_p}{a^3} \right] - 3 \partial_i \left[\frac{n_p n_k n_j}{a^3} \right]$

$\vec{u} \cdot \vec{u} = \delta_{ij} u_i u_j$
 $\frac{\partial}{\partial x^i} \left(\frac{1}{r^3} \right) = -\frac{3}{r^4} \frac{\partial r}{\partial x^i}$
 $\vec{F}_e + \vec{F}_m = 0$
 $\vec{V}_p = \dots$
 $\frac{1}{8\pi\eta|\vec{n}|} \left[\frac{|\vec{n}|^2}{r^3} - 3\frac{(\vec{a} \cdot \vec{n})^2}{r^5} + \frac{|\vec{n}|^2}{r^3} - 3\frac{(\vec{a} \cdot \vec{n})^2}{r^5} - \frac{3}{r^5} |\vec{n}|^2 (\vec{a} \cdot \vec{n}) \vec{n} \right]$
 $\frac{n_i n_j n_k}{8\pi\eta|\vec{n}|} \partial_i \partial_j \left(\frac{1}{r} \right) = \frac{n_i n_j n_k}{8\pi\eta|\vec{n}|} \partial_i \left(-\frac{n_j}{r^3} \right) = -\frac{n_i n_j n_k}{8\pi\eta|\vec{n}|} \left[\frac{\delta_{ij} r^3 - 3r n_i n_j}{r^6} \right]$
 $= -\frac{n_i n_j n_k}{r^3} + \frac{3(\vec{a} \cdot \vec{n})^2}{r^5} n_k$

$\frac{1}{r}(\vec{n}) = -\frac{1}{r^2} \nabla^2 \left(\frac{1}{r} \right)$
 $= \frac{1}{8\pi\eta r^3} \left[-\frac{1}{r^2} + \frac{3\vec{n} \cdot \vec{n}}{r^2} \right] \left(\frac{1}{r} \right)$
 $H(\vec{n}, \vec{n}) = \frac{1}{8\pi\eta r^3} \left[-1 + \frac{3(\vec{a} \cdot \vec{n})^2}{|\vec{a}|^2 |\vec{n}|^2} \right]$
 $T(r) = \frac{1}{8\pi\eta} \frac{1}{r} \left[I + \frac{3\vec{a} \cdot \vec{a}}{r^2} \right]$
 $\frac{1}{r^2} \rightarrow S_{\text{area}}, \frac{1}{r^3} \rightarrow Q_{\text{dip}}$
 $\frac{d}{dt} (\vec{u} \vec{v}^T) = \dot{\vec{u}} \vec{v}^T + \vec{u} \dot{\vec{v}}^T$

$$\rightarrow \delta_{jp} \left[\frac{r^3 \delta_{ik} - 3r_i r_k r_j}{r^6} \right] + \delta_{jk} \left[\frac{r^3 \delta_{ip} - 3r_i r_p r_j}{r^6} \right] - 3 \left[\frac{r^5 (\delta_{ip} r_k r_j + \delta_{ik} r_p r_j + \delta_{ij} r_p r_k) - 5 r_i^2 r_p r_k r_j}{r^{10}} \right]$$

$$+ \left[\frac{\delta_{jp} \delta_{ik}}{r^3} - \frac{3 \delta_{jp} r_i r_k}{r^5} \right] + \left[\frac{\delta_{jk} \delta_{ip}}{r^3} - \frac{3 \delta_{jk} r_i r_p}{r^5} \right] - \frac{3}{r^5} \left[\delta_{ip} r_k r_j + \delta_{ik} r_p r_j + \delta_{ij} r_p r_k \right] + \frac{15}{r^7} r_i r_p r_k r_j$$

$$T_{\text{ann.}} = \frac{1}{8\pi\eta |n|} \left[\frac{\bar{n} |n|^2}{r^3} - \frac{3 \bar{n} (\bar{n} \cdot \bar{n}) |n|^2}{r^5} + \frac{\bar{n} |n|^2}{r^3} - \frac{3 (\bar{n} \cdot \bar{n})^2 |n|}{r^5} - \frac{3 |n| (\bar{n} \cdot \bar{n}) \bar{n}}{r^5} \right]$$

$$+ \left[-\frac{3 (\bar{n} \cdot \bar{n})^2 \bar{n}}{r^5} - \frac{3 |n|^2 (\bar{n} \cdot \bar{n}) \bar{n}}{r^5} + \frac{15 (\bar{n} \cdot \bar{n})^3 \bar{n}}{r^7} + \frac{3 (\bar{n} \cdot \bar{n})^2 \bar{n}}{r^5} \left(-\frac{|n|^2 \bar{n}}{r^3} \right) \right]$$

$$\frac{n_i n_j n_k \partial_i \partial_j \left(\frac{1}{r} \right)}{8\pi\eta |n| (\hat{n} \cdot \nabla)^2 [\bar{T}(n \cdot \hat{n})]} = \frac{n_k}{|n|} \partial_i \left[\frac{-r_j}{r^3} \right] = \frac{-n_i n_j n_k}{8\pi\eta |n|} \left[\frac{\delta_{ij} r^3 - 3 r_i r_j}{r^6} \right]$$

$$= -\frac{n_i n_j n_k}{r^3} + \frac{3 (\bar{n} \cdot \bar{n})^2 n_k}{\sqrt{5}}$$

$$\frac{u}{T}(n) = -\frac{1}{8\pi\eta r^3} \left[-\frac{r^2}{2} \right]$$

$$f(n, n) = \frac{1}{8\pi\eta r^3}$$

$$T(r) = \frac{1}{8\pi\eta}$$

$$\frac{1}{r^2} \rightarrow S_{\text{sur}}$$

$$\frac{d}{dt} (uv^{-1}) =$$

$$\begin{aligned}
 & \rightarrow \delta_{jp} \left[\frac{r^3 \delta_{ik} - 3r_i r_k r_j}{r^6} \right] + \delta_{jk} \left[\frac{r^3 \delta_{ip} - 3r_i r_p r_j}{r^6} \right] - 3 \left[\frac{r_i (\delta_{ip} r_k r_j + \delta_{ik} r_p r_j + \delta_{ij} r_p r_k) - 5r_i^2 r_p r_k r_j}{r^{10}} \right] \\
 & = \left[\frac{\delta_{jp} \delta_{ik}}{r^3} - \frac{3\delta_{jp} r_i r_k}{r^5} \right] + \left[\frac{\delta_{jk} \delta_{ip}}{r^3} - \frac{3\delta_{jk} r_i r_p}{r^5} \right] - \frac{3}{r^5} \left[\delta_{ip} r_k r_j + \delta_{ik} r_p r_j + \delta_{ij} r_p r_k \right] + \frac{15}{r^7} r_i r_p r_k r_j \\
 & \text{Term: } \frac{1}{8\pi\eta|n|} \left[\frac{\bar{n} |n|^2}{r^3} - \frac{3\bar{n}_i (\bar{n} \cdot \bar{n}) |n|^2}{r^5} + \frac{\bar{n} |n|^2}{r^3} - \frac{3(\bar{n} \cdot \bar{n})^2 |n|}{r^5} - \frac{3|n|^2 (\bar{n} \cdot \bar{n})}{r^5} \right] \\
 & \vec{V}_p + \left[-\frac{3}{r^5} (\bar{n} \cdot \bar{n})^2 \bar{n} - \frac{3}{r^5} |n|^2 (\bar{n} \cdot \bar{n}) \bar{n} + \frac{15}{r^7} (\bar{n} \cdot \bar{n})^3 \bar{n} + \frac{3(\bar{n} \cdot \bar{n})^2 \bar{n}}{r^5} - \frac{|n|^2 \bar{n}}{r^3} \right] \\
 & \frac{n_i n_j}{8\pi\eta|n|} \frac{n_k}{(\hat{n} \cdot \nabla)^2} \partial_i \partial_j \left(\frac{1}{r} \right) = \frac{n_k}{|n|} \partial_i \left(\frac{-r_j}{r^3} \right) = \frac{-n_i n_j n_k}{8\pi\eta|n|} \left[\frac{\delta_{ij} r^3 - 3r_i r_j}{r^6} \right] \\
 & = -\frac{n_i n_j n_k}{r^3} + \frac{3(\bar{n} \cdot \bar{n})^2}{r^5} n_k
 \end{aligned}$$