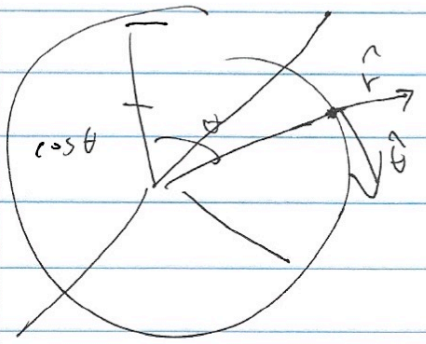
Sucksen 6-4 (c) Scratch

$P_2 = \frac{1}{2}[3x^2 - 1]$

$J_b = \vec{\gamma} \times \vec{M}$, $\quad K_b = \vec{n} \times \hat{n} = M \sin\theta \, \hat{\phi}$

$\vec{m} = \frac{4}{3}\pi R^3 \vec{M}$. $\quad \vec{A}\, d\eta_p = \frac{K}{r^2}\, \vec{m} \times \hat{r}$.

$\vec{B}_{dip} = \vec{\nabla} \times \vec{A} = \frac{\mu_0 m}{4\pi r^3}\left[2\cos\theta \hat{r} + \sin\theta \hat{\theta}\right]$



$\vec{B}_{out} = \frac{\mu_0 m}{4\pi r^3}\left[2\cos\theta \hat{r} + \sin\theta \hat{\theta}\right]$

$\vec{B}_{in} = \frac{2}{3}\mu_0 \vec{M}$ $\qquad \frac{3}{2}x^2 - \frac{1}{2}$

$= \frac{2}{3}\mu_0 \frac{3m}{2 \cdot 4\pi R^3}\hat{z}$ $\qquad \frac{2}{3}P_2 = x^2 - 1/3$.

$= \frac{\mu_0 m \hat{z}}{2\pi R^3}$ $\qquad \frac{2}{3}P_2 + 3P_1$

$\vec{f} = \sigma\left[\vec{E} + \vec{v} \times \vec{B}\right]$

$\vec{v} \times \vec{B} = 0 \Rightarrow \vec{E} = 0$.

$\vec{E}_0 = -\frac{2}{3}\mu_0 M \omega r \sin\theta \left[\sin\theta \hat{r} + \cos\theta \hat{\theta}\right]$ $\qquad \frac{2}{3}P_1 - \frac{2}{3}P_2 = \frac{1}{3} - x^2$

$E_{\perp} = -\frac{2}{3}\mu_0 M \omega R \sin^2\theta$ $\qquad E_{\perp out} - E_{\perp in} = \frac{\sigma}{\epsilon_0}$

$E_{\perp out} - E_{\perp in} = \frac{2}{3}\mu_0 M \omega R \sin^2\theta = \sigma$

$\Rightarrow \sigma = \frac{2}{3}\mu_0 \epsilon_0 M \omega R\left[1 - \cos^2\theta\right]$

$= \frac{2}{3c^2} \frac{3m}{2 \cdot 4\pi R^3} \omega R\left[1 - \cos^2\theta\right]$

$= \frac{m\omega R}{2c^2 \pi R^2}\left[1 - \cos^2\theta\right]$