10/20/13
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Solution to Problem 11.2

* the basic idea is to generalize $\vec{p}_0 = p_0 \hat{z}$ to any $\vec{p}_0$

* Eqn (11.14) $\Rightarrow V = \frac{-\omega}{4\pi\epsilon_0 c} \frac{\vec{p}_0 \cdot \hat{r}}{r} \sin[\omega(t - r/c)] = -\frac{\mu_0 \omega c}{4\pi} \frac{\vec{p}_0 \cdot \hat{r}}{r} \sin[\omega(t - r/c)]$

* Eqn (11.17) $\Rightarrow \vec{A} = -\frac{\mu_0 \omega}{4\pi} \frac{\vec{p}_0}{r} \sin[\omega(t - r/c)]$

* Eqn (11.18) $\Rightarrow \vec{E} = -\frac{\mu_0 \omega^2}{4\pi} \frac{\hat{r} \times (\hat{r} \times \vec{p}_0)}{r} \cos[\omega(t - r/c)]$

* Eqn (11.19) $\Rightarrow \vec{B} = +\frac{\mu_0 \omega^2}{4\pi c} \frac{\hat{r} \times \vec{p}_0}{r} \cos[\omega(t - r/c)]$

$\therefore \vec{S} \equiv \frac{1}{\mu_0} \vec{E} \times \vec{B} = \frac{\mu_0 \omega^4}{16\pi^2 c} \|\hat{r} \times \vec{p}_0\|^2 \frac{\hat{r}}{r^2} \cos^2[\omega(t - r/c)]$

* Eqn (11.21) $\Rightarrow \langle \vec{S} \rangle = \frac{\mu_0 \omega^4}{32\pi^2 c} \|\hat{r} \times \vec{p}_0\|^2 \frac{\hat{r}}{r^2}$