$\vec{p}$ at origin, points in $\vec{z}$ directn

$\Rightarrow \vec{p} = p\hat{z}$. $\qquad p = qd$.

$$V = k\frac{p\cos\theta}{r^2}.$$

$$\vec{E} = \cancel{-\vec{\nabla}V} = \vec{\nabla}V = \frac{d}{dr}V\hat{r} + \frac{1}{r}\frac{dV}{d\theta}\hat{\theta} + \frac{1}{r\sin\theta}\frac{dV}{d\phi}\hat{\phi}$$

$$\Rightarrow \vec{E} = \frac{kp\,2\cos\theta}{r^3}\hat{r} + \frac{kp\sin\theta}{r^3}\hat{\theta}$$

$$= \frac{kp}{r^3}\left[2\cos\theta\hat{r} + \sin\theta\hat{\theta}\right].$$

$$= \frac{kp}{r^3}\left[\cancel{2(\hat{x}+\hat{y})}\right.$$

$\boxed{\text{Griffiths. 3.29}}$ Monopole term vanishes, dipole does not.

dip: $3qa\hat{z} - qa\hat{z} + (-2q)a\hat{y} + (-2q)(a)\hat{y}$

$3qa\hat{z} + q(-a)\hat{z} + (-2q)a\hat{y} + (-2q)(-a)\hat{y}$

$= 4qa\hat{z} + (2qa - 2qa)\hat{y}$.

$= 4qa\hat{z}$.

$$V_{dip} = k\frac{4qa\hat{z}\cdot\hat{r}}{r^2} = \boxed{\frac{k4qa\cos\theta}{r^2}.}$$