Special Problem 4-2.1

Two engineers are having a difference of opinion. One says the following static electric field cannot possibly exist.

$$\mathbf{E}(\bar{r}) = \cos\theta\,\hat{a}_r + r^2\,\hat{a}_\theta$$

The other engineer, however, says that this is in fact a valid static electric field—it violates no physical law.

Which engineer is correct? (Show explicitly why.)