34.11. **Model:** Use the Galilean transformation of fields.

Visualize: Please refer to Figure Ex34.11. We are given $\vec{V} = 1.0 \times 10^6 \hat{i}$ m / s, $\vec{B} = 0.50\hat{k}$ T, and $\vec{E} = \left(\frac{1}{\sqrt{2}}\hat{i} + \frac{1}{\sqrt{2}}\hat{j}\right) \times 10^6$ V / m.

Solve: Equation 34.15 gives the Galilean transformation equation for the electric field in the S and S′ frames: $\vec{E}' = \vec{E} + \vec{V} \times \vec{B}$. The electric field from the moving rocket is

$$\vec{E}' = \left(\hat{i} + \hat{j}\right)0.707 \times 10^6 \text{ V / m} + \left(1.0 \times 10^6 \hat{i} \text{ m / s}\right) \times \left(0.50\hat{k} \text{ T}\right) = \left(0.707 \times 10^6 \hat{i} + 0.207 \times 10^6 \hat{j}\right) \text{ V / m}$$

$$\theta = \tan^{-1}\left(\frac{0.207 \times 10^6 \text{ V / m}}{0.707 \times 10^6 \text{ V / m}}\right) = 16.3^\circ \text{ above the } x'\text{-axis}$$