The region E of integration is the region above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = 2$ in the first octant. Because E is in the first octant we have $0 \le \theta \le \frac{\pi}{2}$. The cone has equation $\phi = \frac{\pi}{4}$, so $0 \le \phi \le \frac{\pi}{4}$, and $0 \le \rho \le \sqrt{2}$. So the integral becomes

$$\int_0^{\pi/4} \int_0^{\pi/2} \int_0^{\sqrt{2}} (\rho \sin(\phi)\cos(\theta))\,(\rho \sin(\phi)\sin(\theta))\,\rho^2 \sin(\phi)\, d\rho\, d\theta\, d\phi$$

$$= \int_0^{\pi/4} \sin^3(\phi)\, d\phi \int_0^{\pi/2} \sin(\theta)\cos(\theta)\, d\theta \int_0^{\sqrt{2}} \rho^4\, d\rho$$

$$= \left(\int_0^{\pi/4} (1 - \cos^2(\phi)) \sin(\phi)\, d\phi \right) \left[\tfrac{1}{2}\sin^2(\theta)\right]_0^{\pi/2} \left[\tfrac{1}{5}\rho^5\right]_0^{\sqrt{2}}$$

$$= \left[\tfrac{1}{3}\cos^3(\phi) - \cos(\phi)\right]_0^{\pi/4} \cdot \tfrac{1}{2} \cdot \tfrac{1}{5} \left(\sqrt{2}\right)^5$$

$$= \left[\frac{\sqrt{2}}{12} - \frac{\sqrt{2}}{2} - \left(\tfrac{1}{3} - 1\right)\right] \cdot (2/5)\sqrt{2} = (1/30)\sqrt{2}(8 - 5\sqrt{2})$$