Special Problem 2-5.13

Determine the surface integral:

\[ \int \int_S \mathbf{A}(\mathbf{r}) \cdot d\mathbf{s} \]

where:

\[ \mathbf{A}(\mathbf{r}) = \left( \frac{\rho^2 + z^2}{5} \right) \mathbf{\hat{a}}_x + z \mathbf{\hat{a}}_y + \rho \mathbf{\hat{a}}_z \]

and surface \( S \), lying entirely on the \( y-z \) plane, has shape: