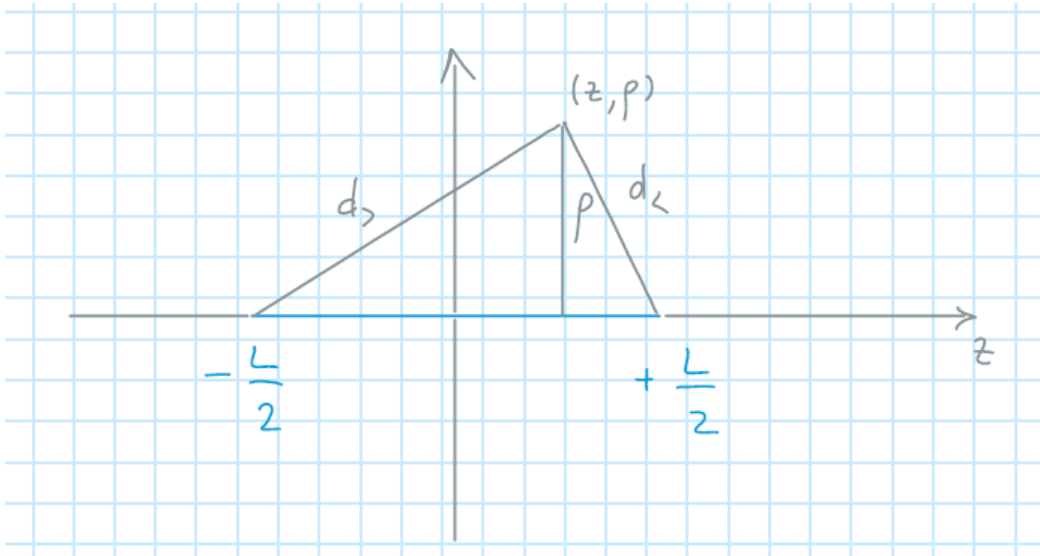


Charged line segment

Calculate the electric potential due to a charged line segment of length L in a generic point P in the space surrounding the segment. The linear charge density is uniform. What is the shape of the equipotential surfaces?



Hints:

Use cylindrical coordinates. Use the integral

$$\int dz \frac{1}{\sqrt{a^2 + z^2}} = \ln \left(z + \sqrt{a^2 + z^2} \right) .$$

Rewrite the potential in terms of the variables

$$u = \frac{1}{2} (d_< + d_>) , \quad t = \frac{1}{2} (d_< - d_>) .$$

Prove that the potential depends only on u .