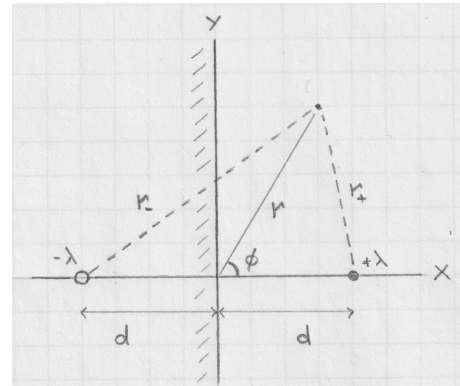


[lex18] Line charge near plane conducting surface

A uniformly charged line in z -direction with line charge density $\lambda > 0$ is positioned on the x -axis at $x = d > 0$. The yz -plane is a conducting surface facing the line charge.

- Use the method of images to determine the induced surface charge density $\sigma(y)$.
- Plot the profile of σ versus y .
- Show that the induced charge per unit length on the conducting surface balances that on the line charge:

$$\int_{-\infty}^{+\infty} dy \sigma(y) = -\lambda.$$



Solution: