

PHY 712 – Problem Set #6

Continue reading Chapters 1-3 in **Jackson**

1. Consider a static charge distribution of cylindrical symmetry extended uniformly along the z -axis. In term the cylindrical radius ρ and angle ϕ the charge density is given by

$$d(\rho, \phi) = \begin{cases} 0 & \text{for } 0 \leq \rho < a \\ d_0 & \text{for } a \leq \rho \leq b \\ 0 & \text{for } \rho > b \end{cases} \quad (1)$$

Here d_0 represents a charge density constant and a and b represent constant lengths with $b > a$. Find the corresponding electrostatic potential $\Phi(\rho, \phi)$ and electrostatic electric field which are well behaved for $\rho \rightarrow \infty$, by directly solving the differential equation or by using the appropriate Green's function.