

Problem A

A sphere of radius R is made up of a linear dielectric material with dielectric constant ϵ_r . Embedded in the sphere is a uniform free charge density ρ_f . Outside the sphere there is no free charge. Determine the displacement field \mathbf{D} , the electric field \mathbf{E} , the bound charge ρ_b , and the charge ρ both inside and outside the sphere.