3. Sucking (7 p)

Let a large vessel be filled with an incompressible dielectric liquid of density of mass density ρ_m (the relative dielectric permeability $\varepsilon \approx 1$). This liquid carries homogeneous volume charge of density ρ_e which is so small that the electric field E_0 created by it is negligible: $E_0\rho_e \ll g\rho_m$, where g is the free fall acceleration. Surface tension can be also neglected. All the heights will be measured from the unperturbed height of the liquid surface. A point charge $-q$ of opposite sign is brought to the height H, due to which a kink is formed on the liquid surface.

1) Determine the height of the kink a.

2) If the height of the charge is slowly decreased, at which height h the liquid will start flowing to the point charge?