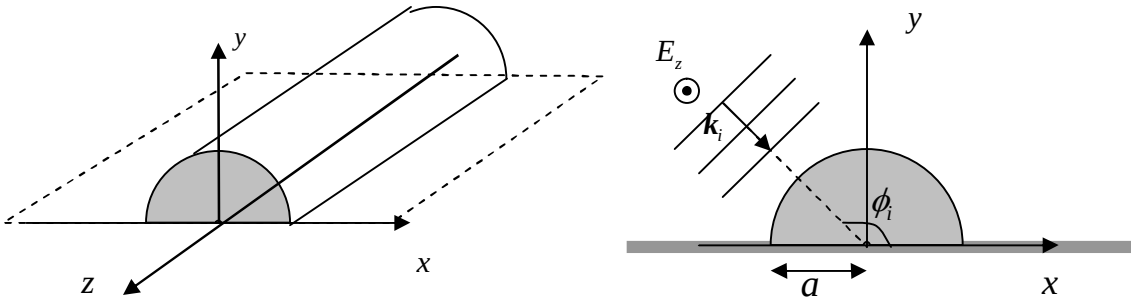
EM Scattering (6.9.1389)

Name: Student nr.:

Problem 1:

Consider a perfectly conducting, infinitely long, half-cylinder mounted on top of a perfectly conducting infinite plane. The radius of the half-cylinder is a and its axis coincides with the z-axis. An incident TM plane wave with the electric field vector in the z-direction, a wave vector $\boldsymbol{k}_i$ parallel to the x-y plane, and an amplitude of E_0, is scattered by the structure. Find the total electric field in this 2D scattering problem. The background medium is vacuum.



Problem 2:

An incident plane wave is propagating in vacuum along the +x-axis. The wave is linearly polarized along the y-axis and has an amplitude of E_0. The wave is scattered by an infinitely long dielectric cylinder with the radius a and relative dielectric constant ε_r. The axis of the cylinder coincides with the z-axis.

1. Find the electric field inside the dielectric cylinder by using the Rayleigh approximation (electric field is assumed constant inside the object and depolarization factors are used)
2. Compute the scattered field in the far-field zone by using the above result. (This is a 2D problem. Do not directly use 3D far-field expressions!)