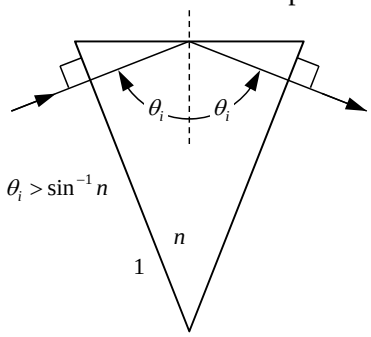
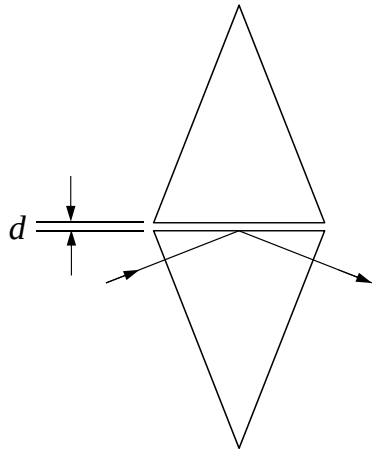
2013 EE Qualifying Examination
Electromagnetics
Professor Joseph M. Kahn

Questions

1. a. Total internal reflection occurs at the upper surface of the prism. Describe any fields in the region above that surface. Sketch surfaces of constant phase. Sketch surfaces of constant amplitude. Describe any propagation of the fields and any associated energy flow. Describe their relation to boundary conditions and whether these depend on the vector nature of the fields.



b. A second identical prism is brought close to the first prism. Describe what happens to the propagating beam as a function of the gap spacing d.



2. At a particular instant of time, two particles of equal charge q are positioned as shown and are moving at speed v as shown. Describe the forces on the two particles. Are these equal and opposite?