Homework

(cheng 3-30)

The space between a parallel-plate capacitor of area S is filled with a dielectric whose permittivity varies linearly from ε_1 at one plate (y=0) to ε_2 at the other plate (y=d). Neglecting fringing effect, find the capacitance.

(cheng 3-33)

A cylindrical capacitor of length L consists of coaxial conducting surfaces of radii r_i and r_o.
Two dielectric media of different dielectric constants ε_{r1} and ε_{r2} fill the space between the conducting surfaces as shown in Fig. 3-42. Determine its capacitance.

(cheng 3-35)

Assuming the earth to be a large conducting sphere (radius $= 6.37 \times 10^3 km$) surrounded by air, find
(a) the capacitance of the earth;
(b) the maximum charge that can exist on the earth before the air breaks down.

Homework

(cheng 3-38)

The two parallel conducting wires of a power transmission line have a radius a and are spaced at a distance d apart. The wires are at a height h above the ground. Assuming the ground to be perfectly conducting and both d and h to be much larger than a, find the expressions for the mutual and self-partial capacitances per unit length.

(cheng 3-45)

Using the principle of virtual displacement, derive an expression for the force between two point charges +Q and -Q separated by a distance x in free space.

(cheng 3-47)

The conductors of an isolated two-wire transmission line, each of radius b, are spaced at a distance D apart. Assuming D >> b and a voltage V_0 between the lines, find the force per unit length on the lines.