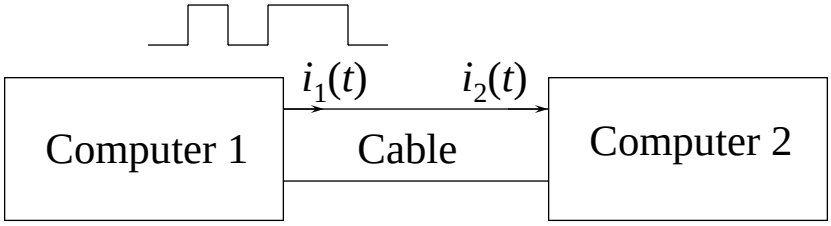
Electrostatics, section 01

Distributed Capacitance

Electrostatics_01_DistributedCapacitance: 1

Computer Communication

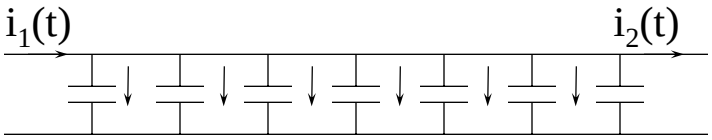


Is $i_1(t) = i_2(t)$?

Electrostatics_01_DistributedCapacitance: 2

No, because of *distributed capacitance.*

A better model for the cable is:



Electrostatic analysis can give us a value for the *capacitance per meter, C'*

Electrostatics_01_DistributedCapacitance: 3

Example

C' = 2pF /m

Cable length, *l* = 2m

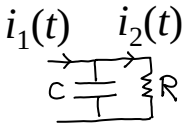
Input resistance of computer 2, *R* = 50 Ohms

$i_1(t)$ = 2ns pulse

Electrostatics_01_DistributedCapacitance: 4

Total (lumped) capacitance of cable, C

$= C'l = 4$ pF

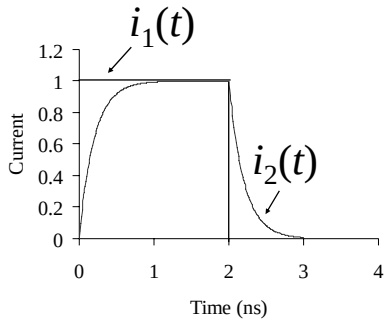


Time constant

$= CR$

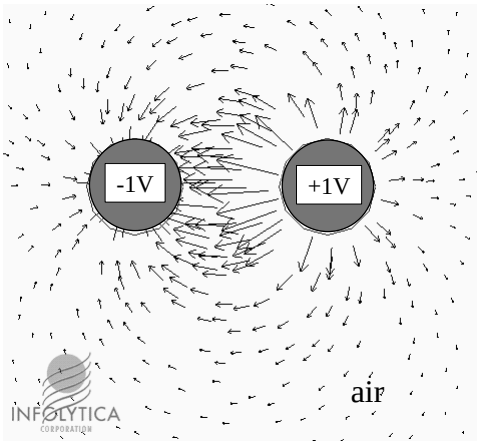
= 4x50 ps

= 0.2 ns



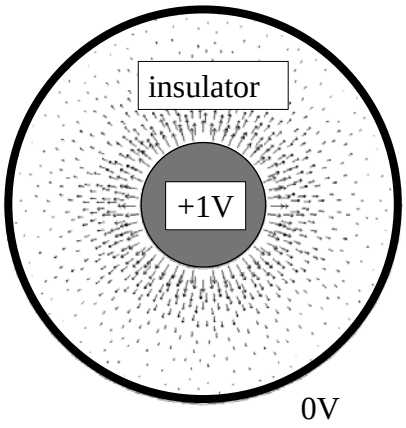
Electrostatics_01_DistributedCapacitance: 5

Two-wire line



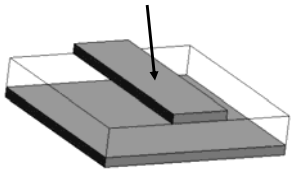
Electrostatics_01_DistributedCapacitance: 6

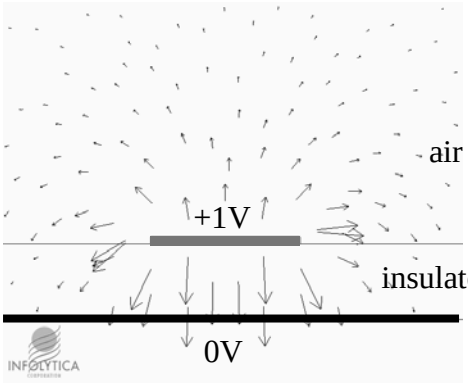
Coaxial cable



Electrostatics_01_DistributedCapacitance: 7

Printed Circuit Board (PCB) Trace





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