E157 Lecture 3 Day Plan

Any questions before quiz

Quiz + Team Quiz + Talk through solution

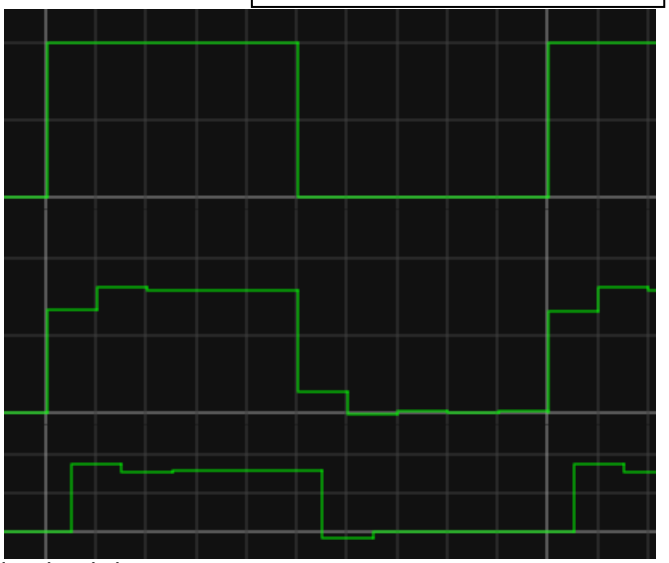
Reminder to submit quiz grades!

Reflection from a

- short
  - Zero voltage, double current
  - Mirror, Mirror → Current doubled b/c mirror universe sucks in current w/ -1V wave.
- capacitor
  - Iload is an RC response, sets reflection boundary condition
  - Intro TDR
  - Parasitic caps can come from fringing fields, corners in traces
- 100Ω load and 25Ω source on 50Ω line, emphasize driving point impedance
  - Vin = 1V
  - Vinit = 50/(25+50)=2/3 V,
  -
  - Gamma,load=(100-50)/(100+50)=+1/3,
  - Vreflect,load=Gamma,load*Vinit=2/9 V,
  - V,load = Vinit+Vreflect,load = 8/9 V
  -
  - Gamma,src=(25-50)/(25+50)=--1/3,
  - Vreflect,source=Gamma,src*Vreflect,load=-2/27 V
  - V,source=V,load+Vreflect,source=22/27 V
  -
  - Zdp,src,init=50 (used to find Vinit)
  - Zdp,load,reflect1
    → Zl/(Zdp+Zl)=V,load / Vin
    →100/(Zdp+100)=8/9
    →Zdp=12.5
  - Zdp,src,reflect1
    → Zdp/(Zdp+Zs)=V,source
    → Zdp/(Zdp+25)=22/27
    → Zdp=110
- spot discontinuity, looks like shunt resistor

Falstad simulator code below:

```
$ 1 0.000005 10.20027730826997 50 5 50 5e-11
R 0 80 0 128 0 2 10 0.5 0.5 0 0.5
r 32 80 112 80 0 25
171 144 80 352 80 0 0.005 50 16 0
r 416 80 416 144 0 100
w 352 80 416 80 0
w 352 96 352 144 0
w 352 144 416 144 0
g 144 96 144 128 0 0
w 144 80 112 80 0
w 0 80 32 80 0
o 9 64 0 4102 1.25 0.025 0 2 9 3
o 8 64 0 4102 1.25 0.025 0 2 8 3
o 4 64 0 4102 1.25 0.0125 0 2 4 3
```



Edge rate and reflections

- you only bounce off of things that are big compared to lambda,
- 10-90 rise time is tr. Size of 10-90 edge calculated w/ velocity
- Appropriate analysis frequency for given tr is fa~0.5/tr