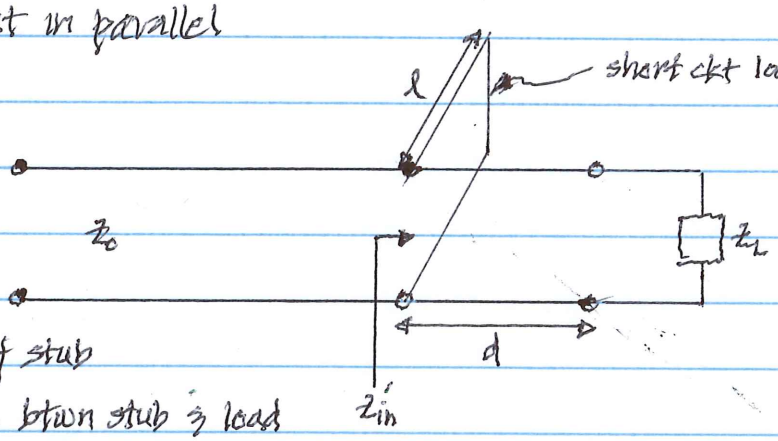
EE331 – LECT. #13 FEB. 12, 2020

shunt stub tuning – single stub w/ short ckt load

λ/4 transformer used to match real load to line, e.g., 33Ω

stub tuner used to match complex loads to line, e.g., 27 + j30Ω

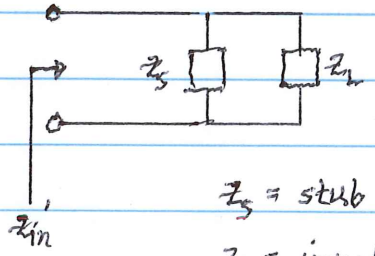
shunt = put in parallel



l = length of stub

d = distance btwn stub & load

|||



Z_s = stub impedance

Z_L = imped of load & line

goal is to find d & l. {note: opposite of book defn's}

recall

$$z_0 = Z_0/Z_0 = 1$$

dropping prime:

$$z_{in} = z_0 = 1 \quad \text{want this}$$

recall for parallel impedances:

$$z_{in} = \frac{1}{1/z_s + 1/z_d} = \frac{z_s z_d}{z_s + z_d}$$

yuck! too hard to find $z_{in} = z_0$

consider

$$Y_{in} = Y_s + Y_d$$

= admittance

yes! just add Y_s & Y_d

aside:

$$y = \frac{1}{z} = g + jb$$

= normalized admittance

where: g = normalized conductance {-}

b = " susceptance {-}

$$\rightarrow \quad Y = \frac{1}{z} = \frac{1}{z z_0} = \frac{y}{z_0}$$

on smith chart r circles become g circles & x circles become b circles

$$r \rightarrow g, \quad x \rightarrow b$$

nice thing:

$$y_{in} = \frac{1}{z_{in}} = \frac{1}{1} = 1$$

but

$$y_{in} = y_s + y_d = 1$$

y_s: purely reactive {jx}

thus,

$$y_3 = -jb$$

thus,

$$y_4 = 1 + jb$$

choose d to make $y_4 = 1 + jb$

" l " " $y_3 = -jb$