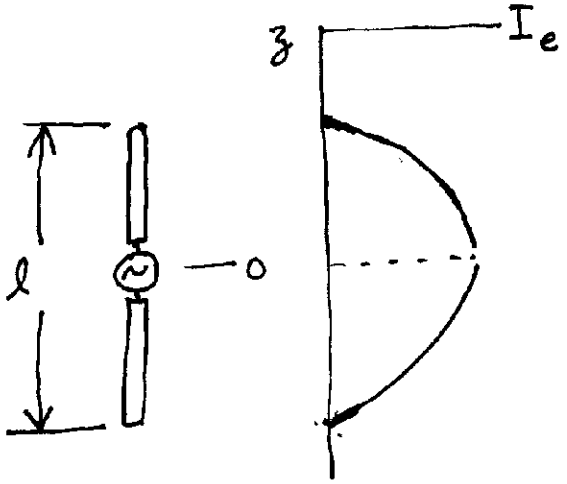
Finite Length Dipole



Source is located at the center, current goes to zero at both ends.

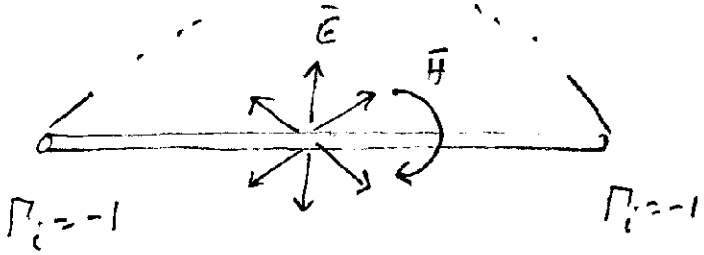
$$I_e = \bar{a}_z I_0 \sin\left[k(\ell/2 - z')\right] \qquad 0 \le z' \le \ell/2$$

$$= \bar{a}_z I_0 \sin\left[k(\ell/2 + z')\right] \qquad -\ell/2 \le z' \le 0$$

/...

... Why?

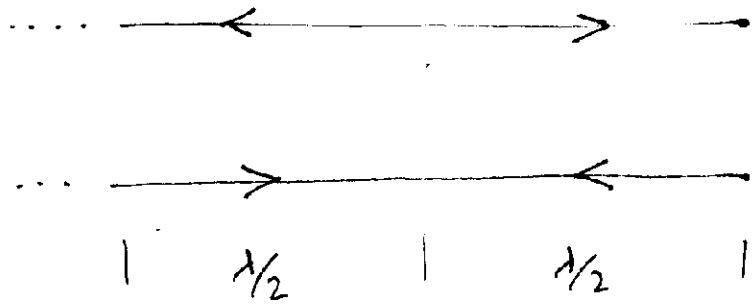
Neglect radiation

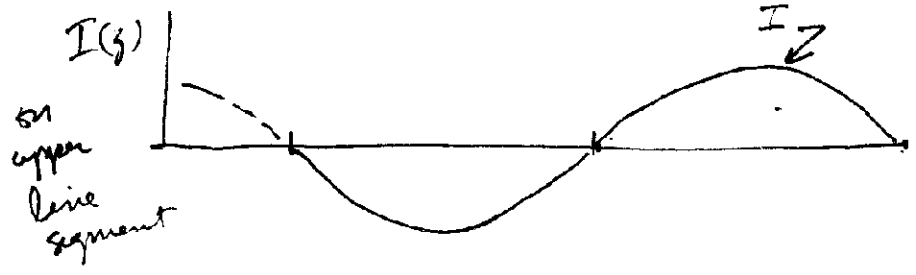


$I = 0$ TEM mode wave $I = 0$

Natural modes of this system are

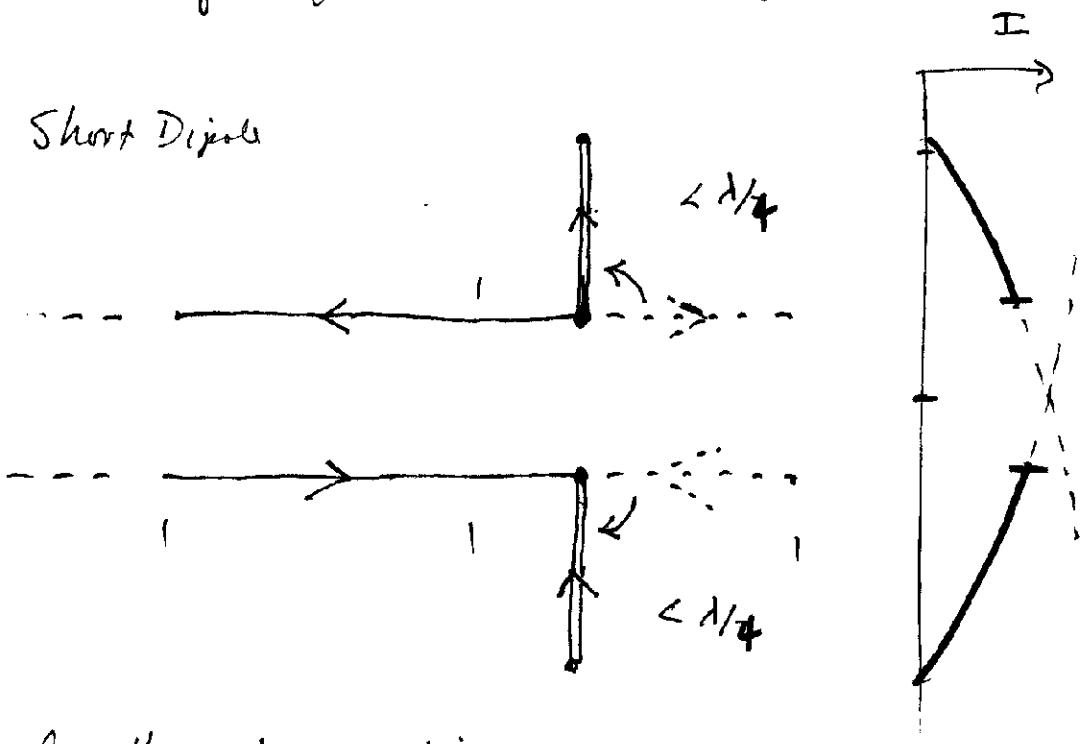
Transmission Line Analog





standing waves.

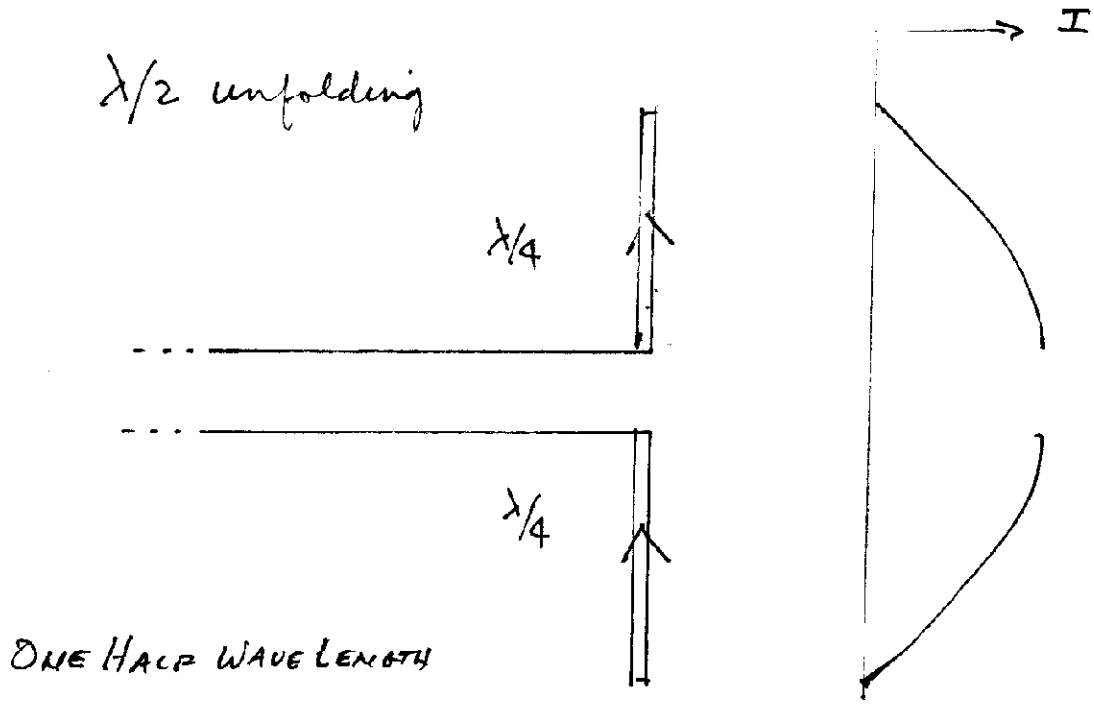
Unfolding the Transmission Line ...



less than ¼ unfolding

/ ...

$\lambda/2$ unfolding



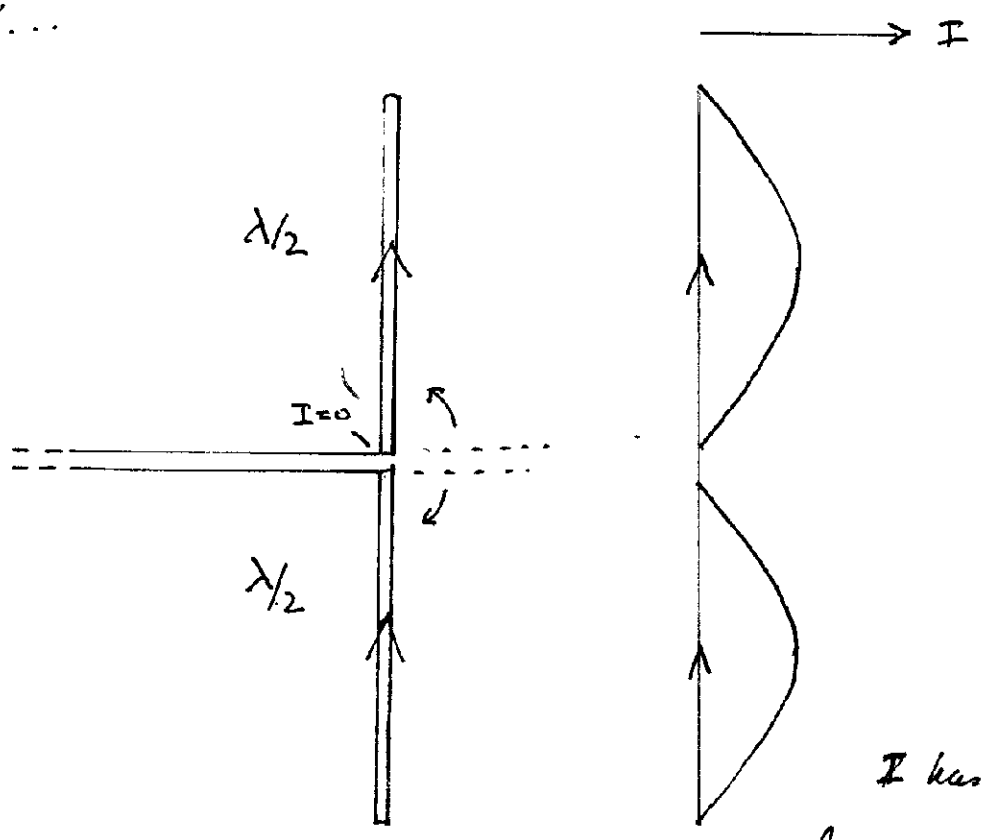
ONE HALF WAVE LENGTH

DIPOLE

I has a loop – everywhere in phase on the dipole

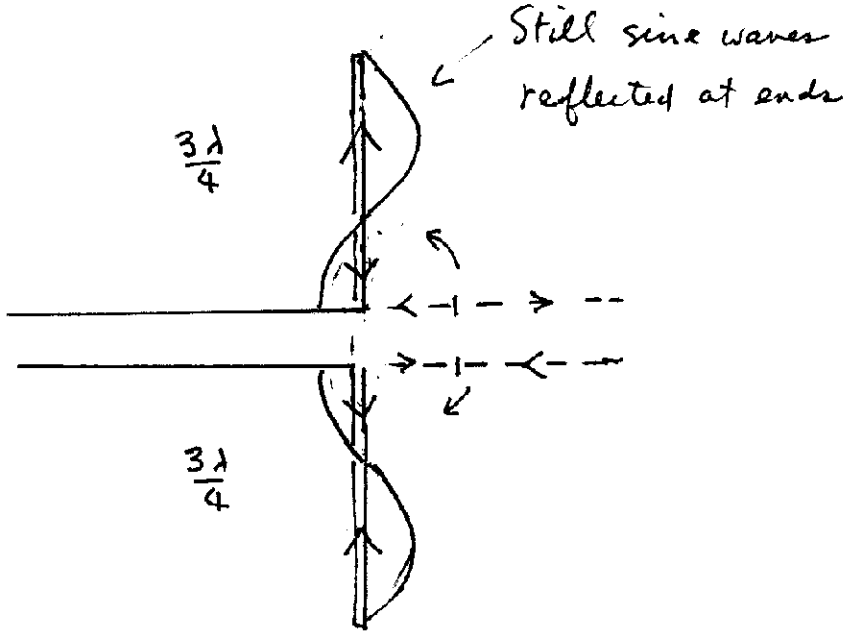
/ ...

/ ...



I has two loops. is in phase

/... Even Longer Dipole ...



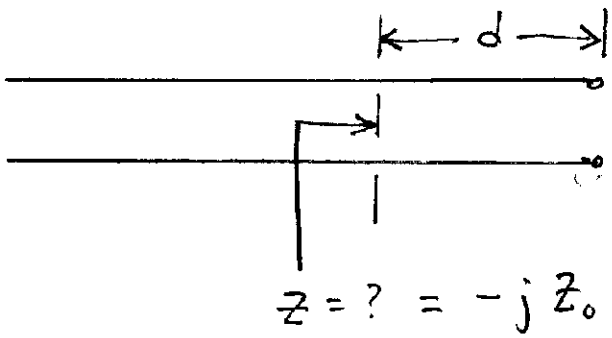
$\frac{3}{2}\lambda$ Dipole

/...

/...

Input Z ?

Retaining Transmission Line Analog



So you should expect some variation in $Z(d)$.