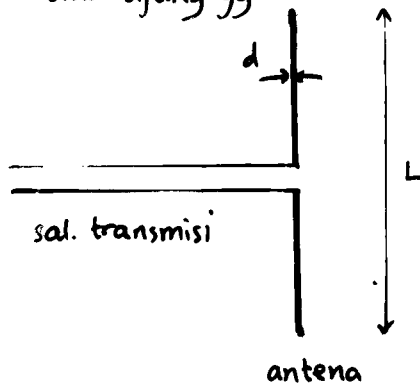


## ① Antena Dipole

- Antena linier, antena dasar
- memiliki dua ujung yg memiliki dua kutub (di-pole)



jika panjang fisik antena jauh lebih pendek daripada panjang gelombang  
( $L \ll \lambda$ )

dan

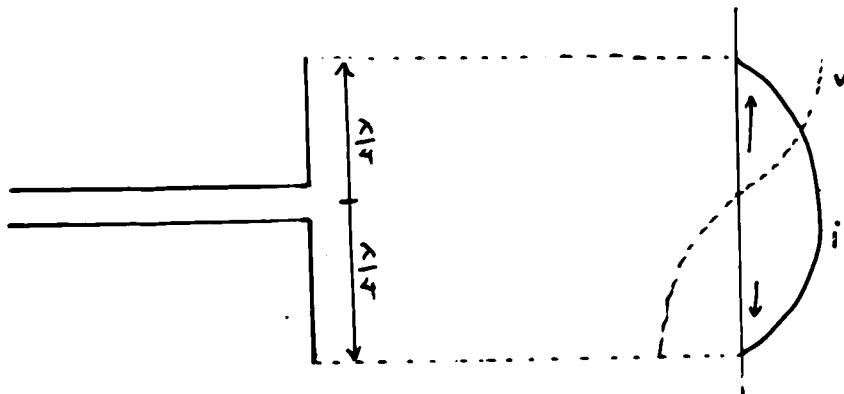
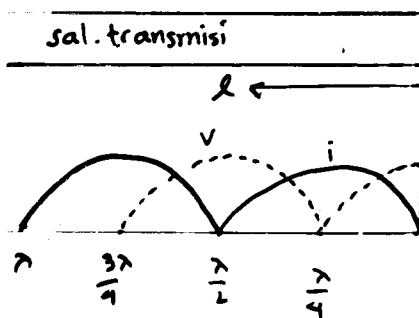
diameter jauh lebih kecil daripada panjang fisik antena

$$(d \ll L)$$

→ dipole pendek & tipis  
(short dipole) (thin linier)

- Dipole setengah gelombang  
(halfwave dipole) Antena Hertz.  
→ antena memiliki panjang  $\frac{1}{2} \lambda$

gel. tegak pd sal. transmisi terbuka

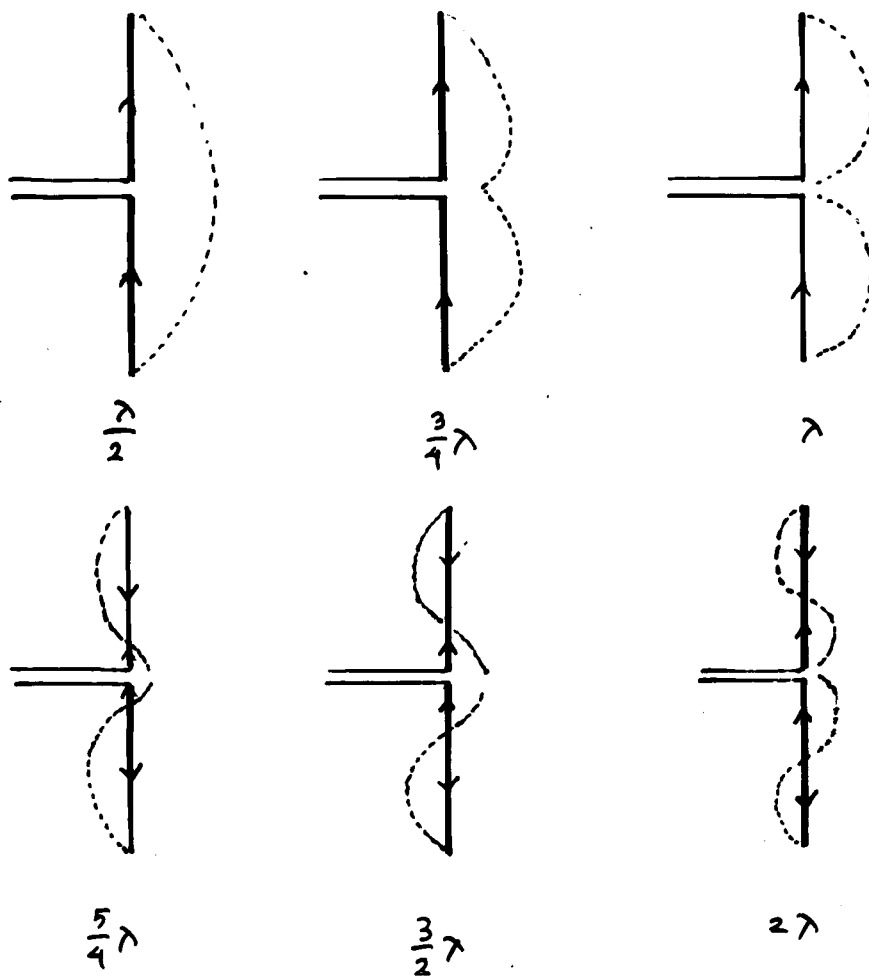


antena  
 $\frac{1}{2} \lambda$

distribusi  
arus & tegangan

distribusi  
impedansi

Pada panjang antenna yg berbeda akan menghasilkan distribusi arus yg berbeda-beda.

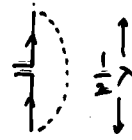
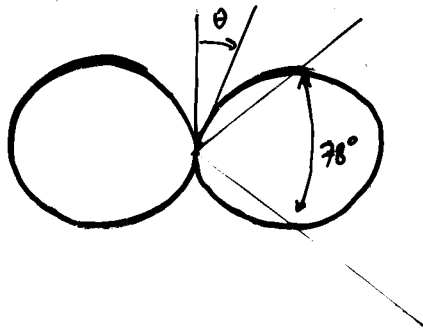


• Rumus umum untuk  $E_{\theta}$  medan listrik E pd panjang antenna yg berbeda

$$E_{\theta} = \underbrace{\frac{j60 [I_0]}{r}}_{\text{tetap}} \underbrace{\left[ \frac{\cos [(\beta L \cos \theta)/2] - \cos (\beta L/2)}{\sin \theta} \right]}_{\substack{\beta = \frac{2\pi}{\lambda} \\ \text{berubah thd panjang (L) antenna.} \\ \text{(faktor pola)}}}$$

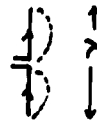
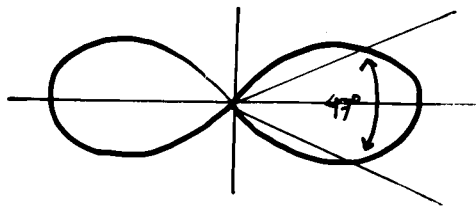
pada antenna  $\frac{1}{2} \lambda \rightarrow L = \frac{1}{2} \lambda$

$$E = \frac{\cos [(\pi/2) \cos \theta]}{\sin \theta} \quad ; \quad 0 \leq \theta \leq 2\pi$$



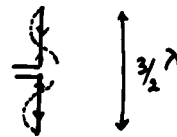
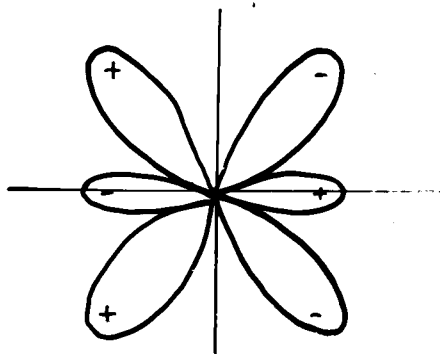
• jika  $L = \lambda$ , maka faktor polanya:

$$E = \frac{\cos(\pi \cos \theta) + 1}{\sin \theta}$$



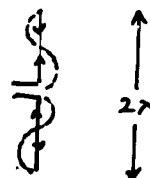
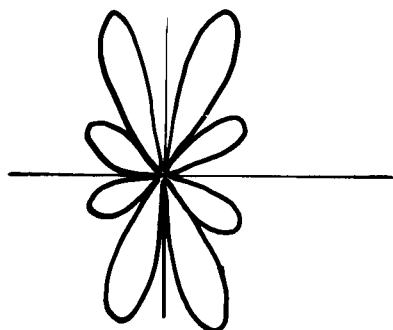
• jika  $L = \frac{3}{2}\lambda$ , maka faktor polanya:

$$E = \frac{\cos(\frac{3}{2}\pi \cos \theta)}{\sin \theta}$$



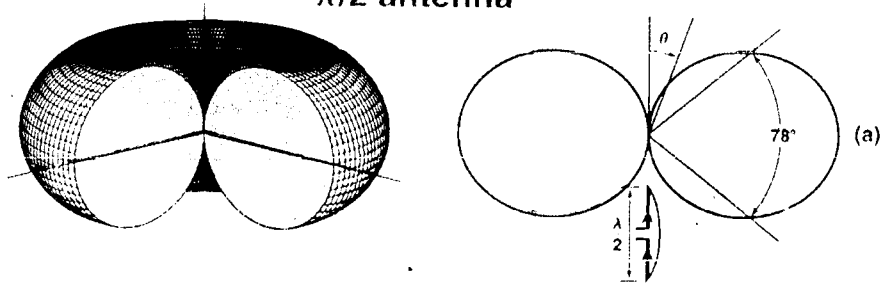
• jika  $L = 2\lambda$ , maka faktor polanya:

$$E = \frac{\cos(2\pi \cos \theta) - 1}{\sin \theta}$$

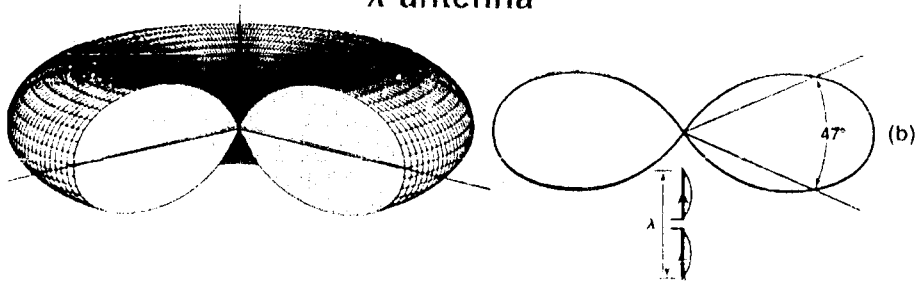


Contoh pola antena Dipole :

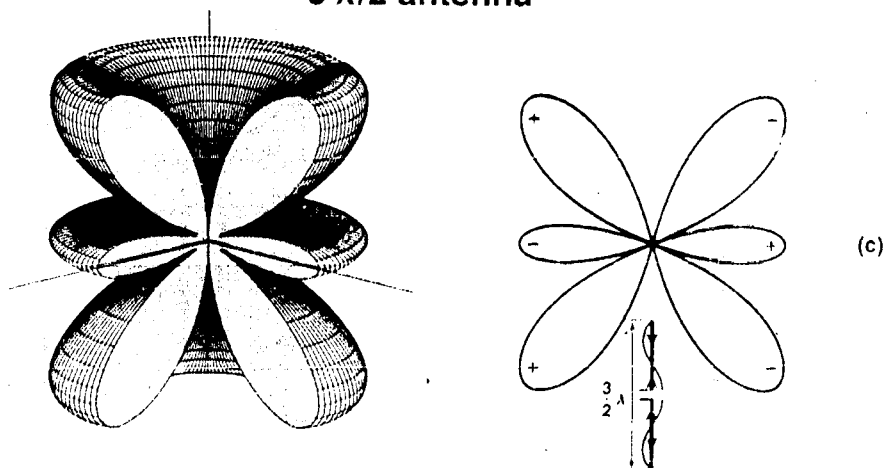
$\lambda/2$  antenna



$\lambda$  antenna



$3\lambda/2$  antenna



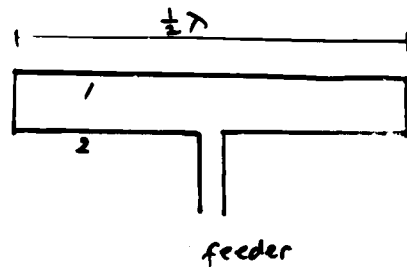
g) Antena folded dipole  
(dipole lipat)

- modifikasi dgn menambah panjang fisik antena dipole
- menambah resistansi antena ( $Z$ )

antena dipole  $\frac{1}{2}\lambda$   
 $Z \approx 70\Omega - 73\Omega$



dipole lipat 2 kawat

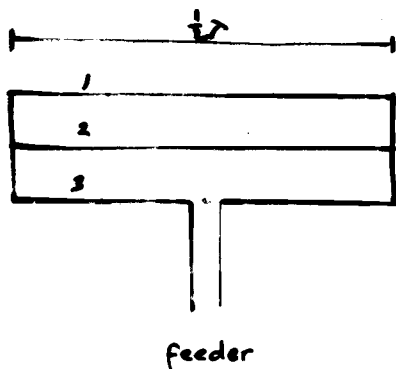


$$Z = 70\Omega \times 4 = 280\Omega$$

$$d \approx \frac{\lambda}{100}$$

peningkatan  $Z$

→  $70 N^2 (\Omega)$  ;  $N$  = jumlah elemen  $\frac{1}{2}\lambda$

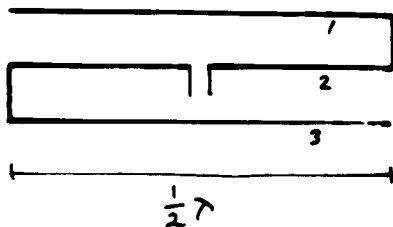


dipole lipat 3 kawat

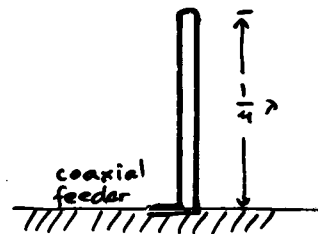
$$Z \approx 70\Omega \times 9 = 630\Omega$$



• dipole lipat 3 kawat



• dipole lipat vertikal  $\frac{1}{4}\lambda$



$$Z \approx 36,5\Omega \times 4 = 146\Omega$$

