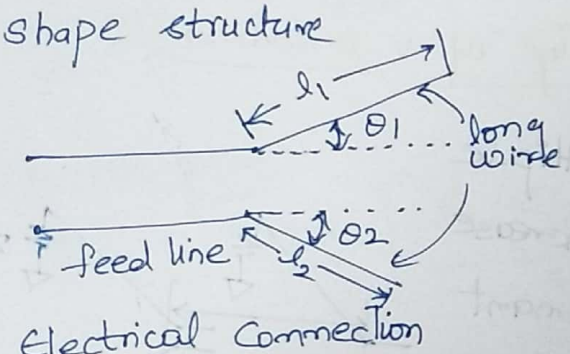
V- Antenna

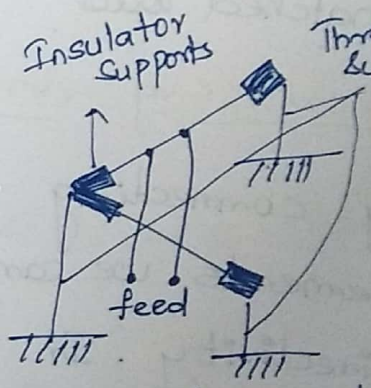
As we know the long wire antenna are having simple structure but for some applications, it is not practically used because of following reasons. They are
→ Low directivity, high side lobes, Angle of beam based on length.
These are avoided with the help of V-antenna.

Structure of V- antenna

This is so called V-antenna because it has V-shape structure



Electrical Connection structure

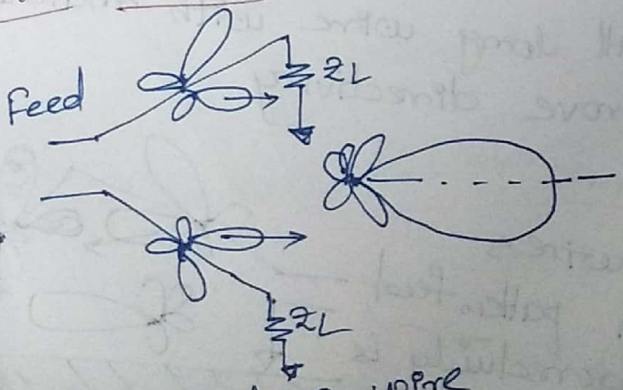


physical structure

Types of V Antenna

→ Resonant V, Non resonant V, Inverted V.

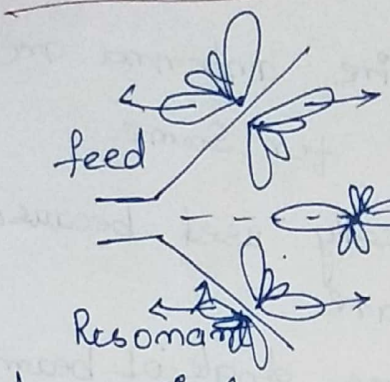
Non Resonant V



The two long wire antennas are terminated with a matched load. The above are the radiation patterns for individual long wire antennas

As the two radiation pattens are in the forward direction the resultant radiation patten will be also in forward direction. As the two long wires are connected to a matched load, these are known non resonant V antenna.

Resonant V



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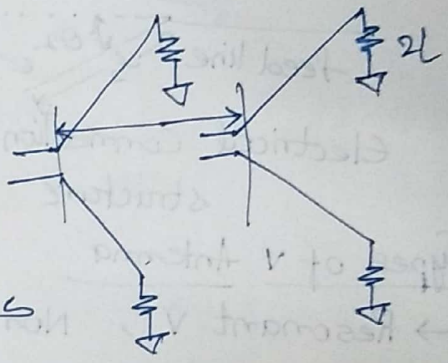
It is so called because, the long wires are not terminated with a matched load. The individual radiation patterns are as shown aside. It has four major lobes. So, resonant V antenna will have major lobes in opposite direction also.

So, these two are differed based on the matched load.

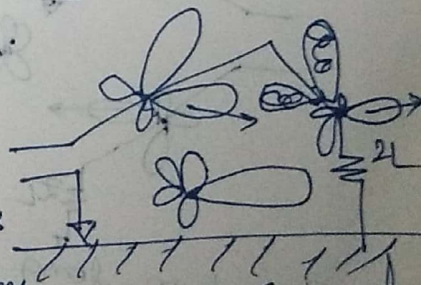
Increasing directivity of V-antenna

By connecting multiple elements we can increase directivity. In resonant type, there are two major lobes, but in non resonant, there is single major lobe.



→ By terminating all long wire with matched load we can improve directivity.

Inverted V type Antenna



As both the long wires are having radiation pattern in same direction, directivity is high. Inverted V antenna functions based on Imaginary Ground Concept. The feed line and load are connected to Ground. The mirror image will be formed as imaginary in it below the Ground.

Design parameters of Resonant Wire antenna

→ length of Resonant wire antenna

$$L = \frac{n\lambda}{2} = 492 \frac{(n-0.05)}{2} \quad (ft)$$

→ Electric field

$$\vec{E} = \frac{60 I_{rms}}{r} \left[\frac{\cos\left(\frac{n\pi}{2}\cos\theta\right)}{\sin\theta} \right] \quad n \text{ is odd}$$

$$= \frac{60 I_{rms}}{r} \left[\frac{\sin\left(\frac{n\pi}{2}\cos\theta\right)}{\cos\theta} \right] \quad n \text{ is even}$$

→ Maximum angle Radiation

$$\cos\theta_{max} = \frac{n-1}{n}$$

→ Radiation Resistance

$$R_r = 73 + 69 \log n.$$

→ These are mostly used in robot appluation because the orientation of radiation pattern is easily changed as long wire antenna is changed accordingly. Therefore, these long wire antennas are used in small scale applications

Disadvantage of V Antenna

→ The radiation pattern will have many considerable minor lobes.

→ These lobes results in horizontally polarized waves transmitted in some directions. Thus Inverted V antenna will receive horizontally polarized waves from these directions.