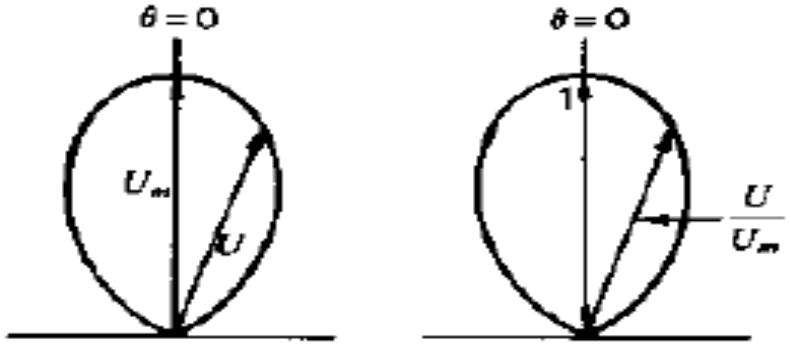
RADIATION INTENSITY AND PATTERN SOURCE

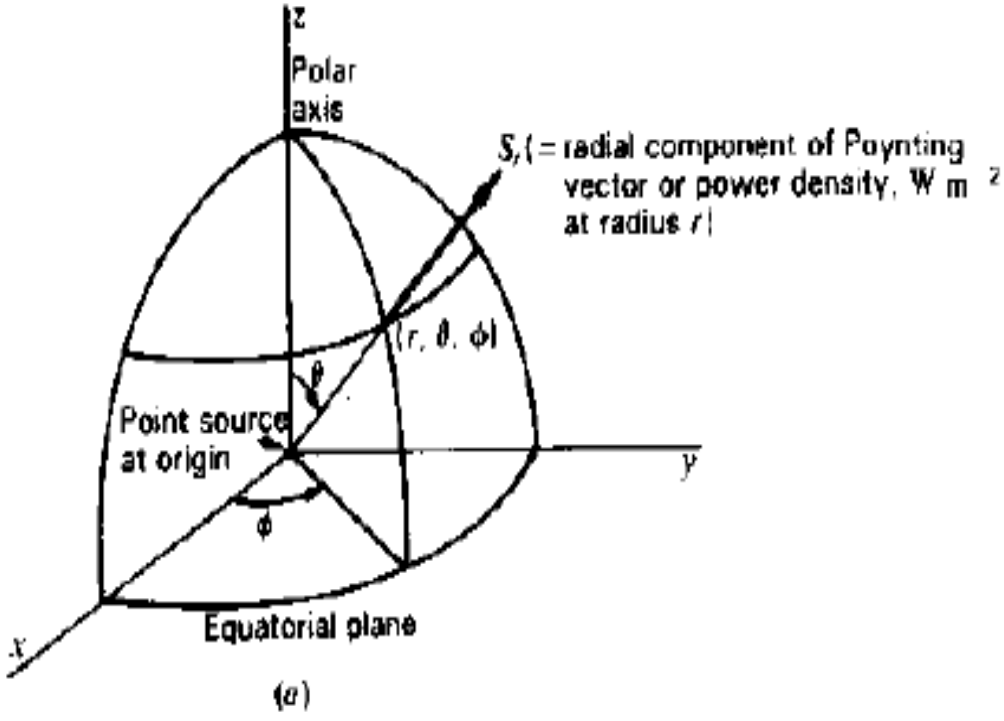
The radiation intensity is total power radiated per unit solid angle and is denoted by **U** and it is expressed as U= P/4π.

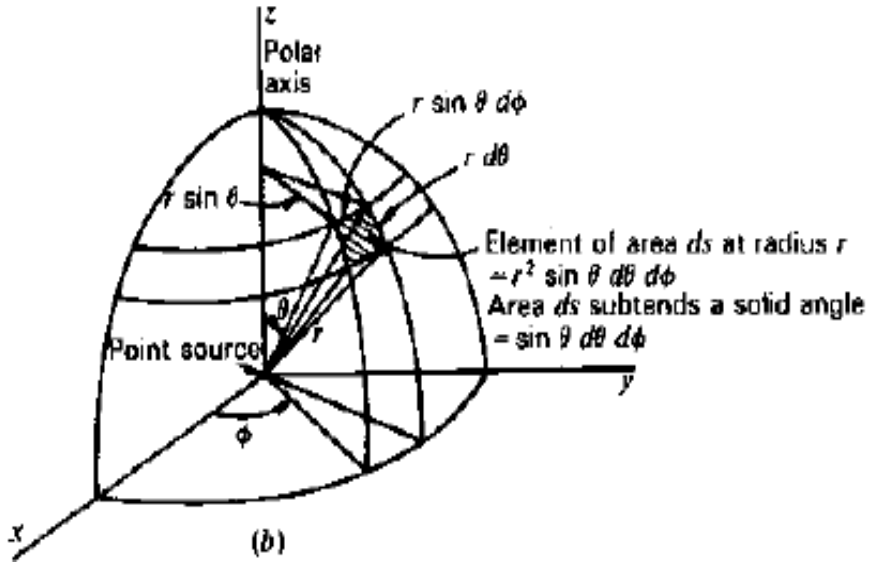


First figure shows radiation intensity of a source and second figure is relative radiation intensity of that source.

POINT SOURCE

A point source is a radiator that has dimensions of a point in space.





POWER PATTERN

The directional property of the antenna is often described in the form of a **power pattern**. The power pattern is simply the effective area normalized to be unity at the maximum.

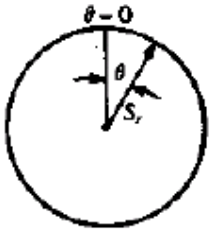


Fig: Power pattern for isotropic source

Power pattern and relative power patterns of a source

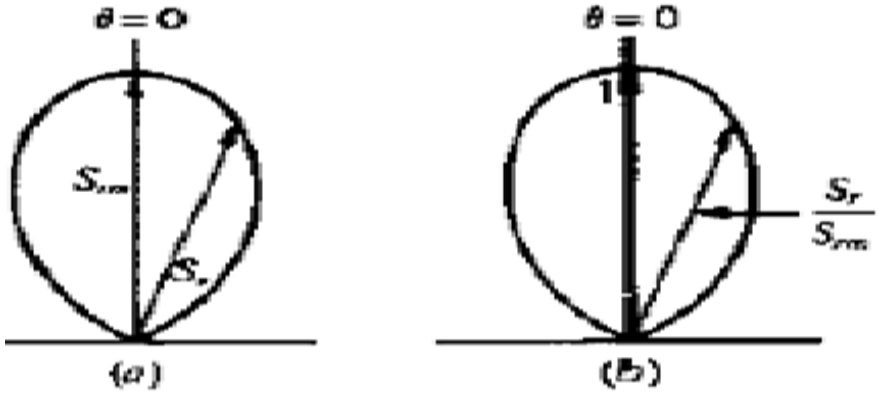


Figure (a) shows power pattern of a source. Figure(b) shows relative power pattern of a same source. Both Patterns have the same shape. The relative power pattern is normalized to a maximum of unity

The radiated energy streams from the source in radial lines.

Time rate of Energy flow/unit area is called as Poynting vector (PowerDensity)

It is expressed as …….watts / square meters.
For a Point source Poynting vector has only radial component Sr
S component in Θ and φ directions are zero. Magnitude of S = Sr
Source radiating uniformly in all directions – Isotropic Source. It is independent of Θ and φ .
Graph of Sr at a constant radius as a function of angle is POWER PATTERN

Field pattern

A pattern showing variation of the electric field intensity at a constant radius r as a function of angle(θ , φ) is called **"field pattern"**

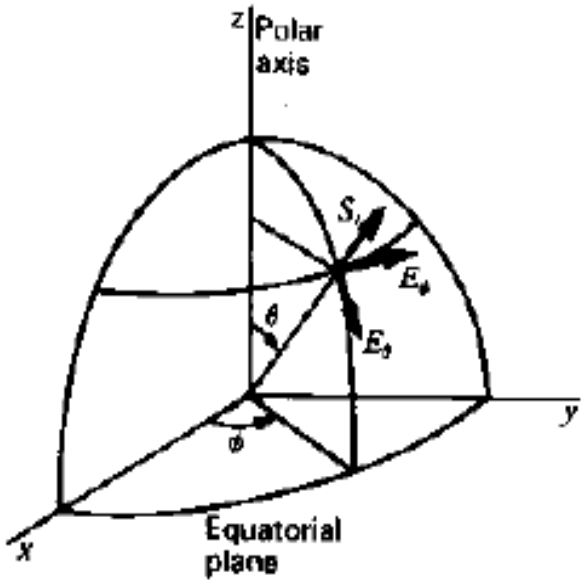


Fig: Relation of poynting vector s and 2 electric field components of a far field

The power pattern and the field patterns are inter-related:

$$P(\theta, \varphi) = (1/\eta)*|E(\theta, \varphi)|2 = \eta*|H(\theta, \varphi)|2$$

P = power
E = electrical field component vector
H = magnetic field component vector
η = 377 ohm (free-space impedance)

The power pattern is the measured (calculated) and plotted received power: $|P(\theta, \varphi)|$ at a constant (large) distance from the antenna
The amplitude field pattern is the measured (calculated) and plotted electric (magnetic)

field intensity, $|E(\theta, \varphi)|$ or $|H(\theta, \varphi)|$ at a constant (large) distance from the antennas