



# Babinet's Principle

- A theorem called Babinet's Principle states that the diffraction pattern for an aperture is the same as the pattern for an opaque object of the same shape illuminated in the same manner. That is, except for the intensity of the central spot, the pattern produced by a diffracting opening of arbitrary shape is the same as a conjugate of the opening would produce.
- This principle can be very useful for making measurements of very small objects. For example a circular hole and a droplet of the same size will produce the same diffraction pattern.



# ANTENNA ARRAYS

- Antenna arrays is group of antennas or antenna elements arranged to provide desired directional characteristics.
- Generally any combination of elements can form an array.
- However equal elements of regular geometry are usually used.



## 2 Element arrays – different cases :

- Based on amplitude and phase conditions of isotropic point sources, there are three types of arrays:
  - (a) Array with equal amplitude and phases
  - (b) Array with equal amplitude and opposite phases
  - (c) Array with unequal amplitude and opposite phases



# Principal Patterns

The E-plane is defined as “the plane containing the electric field vector and the direction of maximum radiation,”

The H-plane as “the plane containing the magnetic-field vector and the direction of maximum radiation.”

The x-z plane (elevation plane;  $\phi = 0$ ) is the principal E-plane  
The x-y plane (azimuthal plane;  $\theta = \pi/2$ ) is the principal H-plane.



## **n Element Uniform Linear Arrays :**

- Highly directive single beam pattern can be obtained by increasing the point sources in the array from 2 to  $n$  say.
- An array of  $n$  elements is said to be linear array if all the individual elements are spaced equally along a line.
- An array is said to be uniform array if the elements in the array are fed with currents with equal magnitudes and with uniform progressive phase shift along the line.