# Lecture 3

# Wave guide

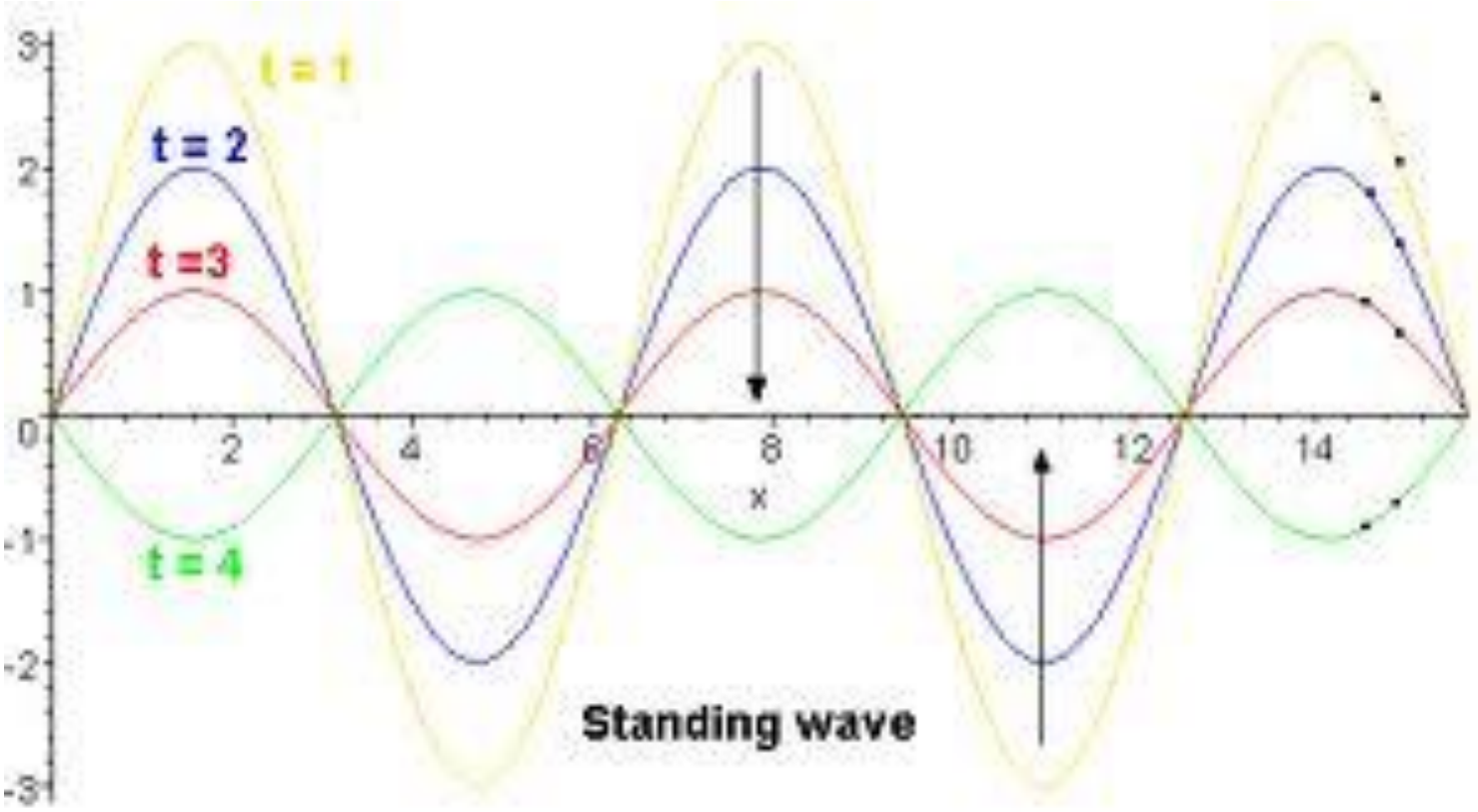
- A hollow metallic tube of uniform cross section for transmitting electromagnetic waves by successive reflection from the inner walls of the tube is called a wave guide

# Comparison of wave guide with 2 transmission lines

- Wave travelling in a wave guide has a phase velocity and will be attenuated as in a transmission line
- When the wave reaches the end of the wave guide it is reflected unless the load impedance is adjusted to absorb the wave
- Any irregularities in a wave guide produces reflection just like an irregularities in a transmission line

# Comparison of wave guide with 2 transmission lines

- Reflected wave can be eliminated by proper impedance matching as in transmission line
- When both incident and reflected waves are proper impedance matching as in a transmission line
- When both incident and reflected waves are present in a waveguide , a standing wave pattern results as in a transmission line

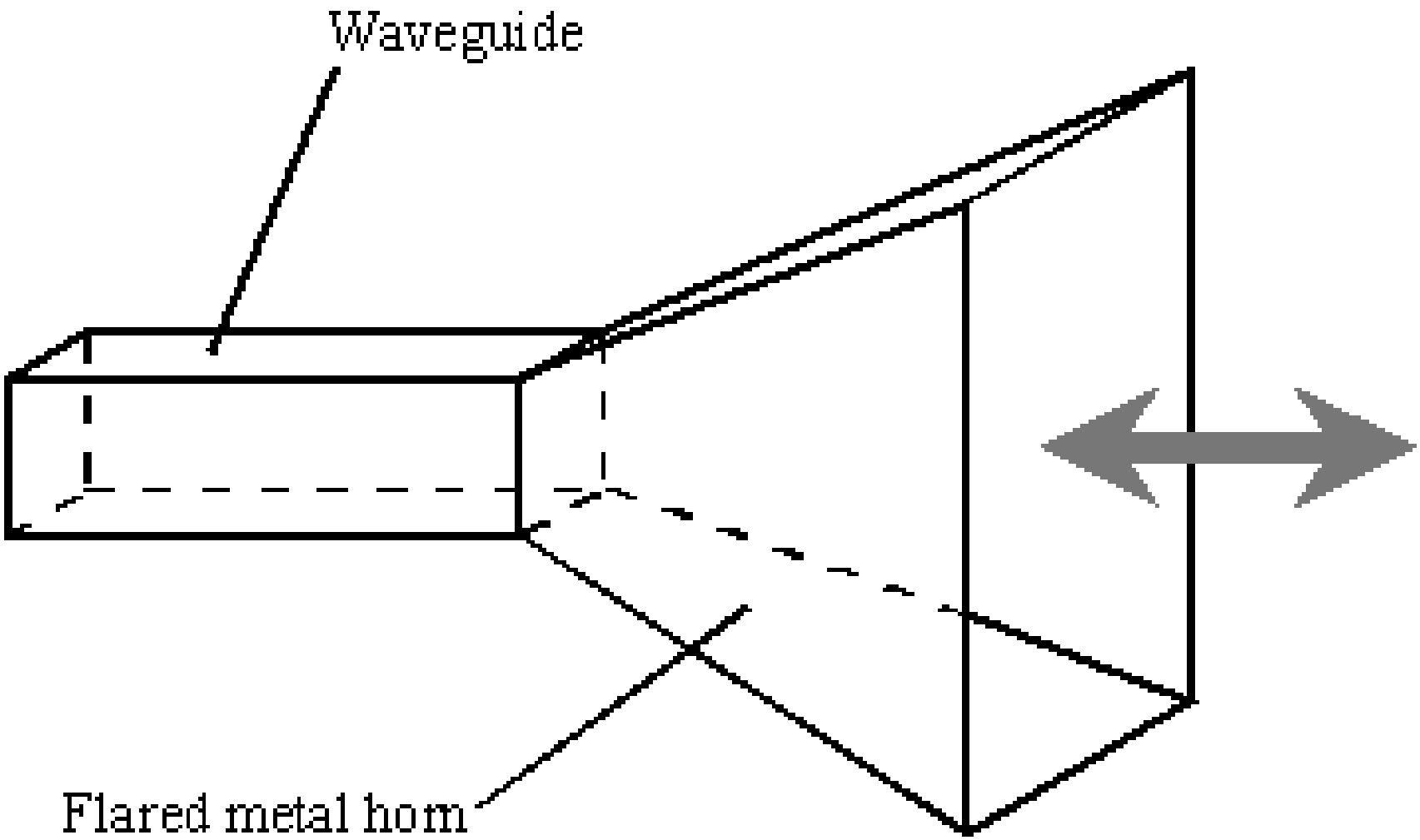

t = 1
t = 2
t =3
t = 4
3
2
1
0
-1
-2
-3
2
4
6
8
10
12
14
x
Standing wave

1. The is a cut-off value for the frequency of transmission(f) depending upon the dimensions and shape of the wave guide . Only Waves having frequencies greater than cut-off-frequency Fc will be propagated .
2. Wave Guide is a one conductor transmission system
3. Velocity of propagation of the waves inside the wave guide is quite different from that free space

- In wave guide ,  ---wave impedance
- Wave guides – field theory
- Cavity resonator principle

# Types of wave guide

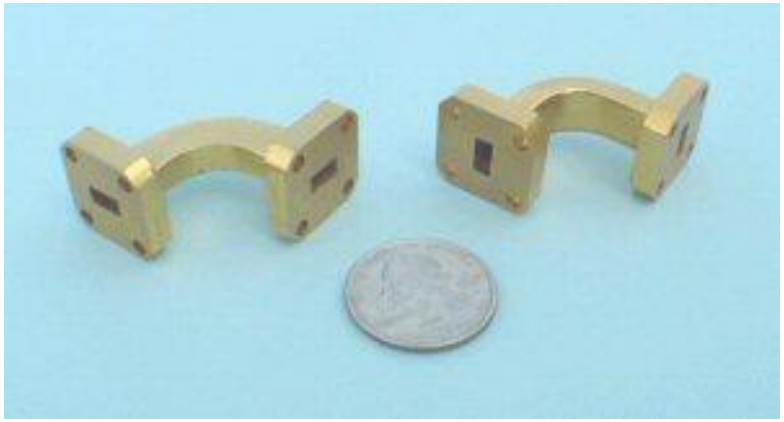
- Rectangular wave guide
- Circular wave guide
- Elliptical Wave guide
- Single Ridged
- Double ridged


Waveguide
Flared metal horn

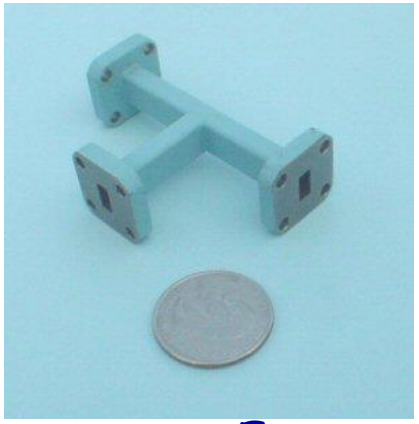
# Waveguide components


Rectangular waveguide

Waveguide to coax adapter



Waveguide bends



E-tee

Figures from: www.microwaves101.com/encyclopedia/waveguide.cfm

# Circular wave guide