



SNS COLLEGE OF ENGINEERING

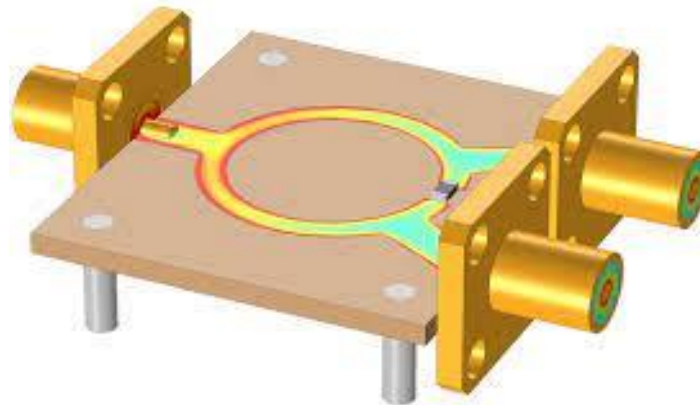
(Autonomous)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING



19EC602- MICROWAVE AND OPTICAL ENGINEERING

UNIT-2 ATTENUATOR



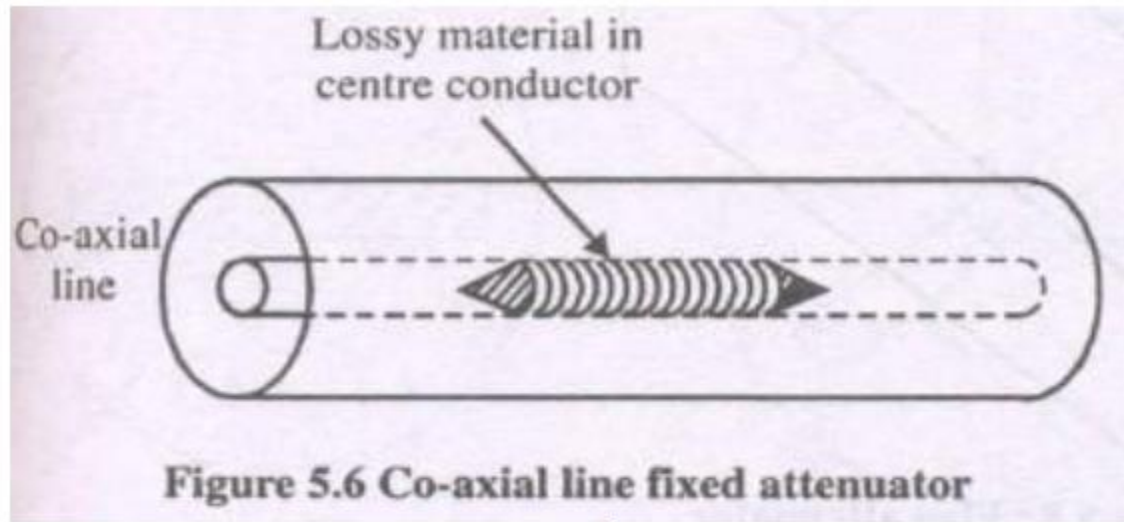


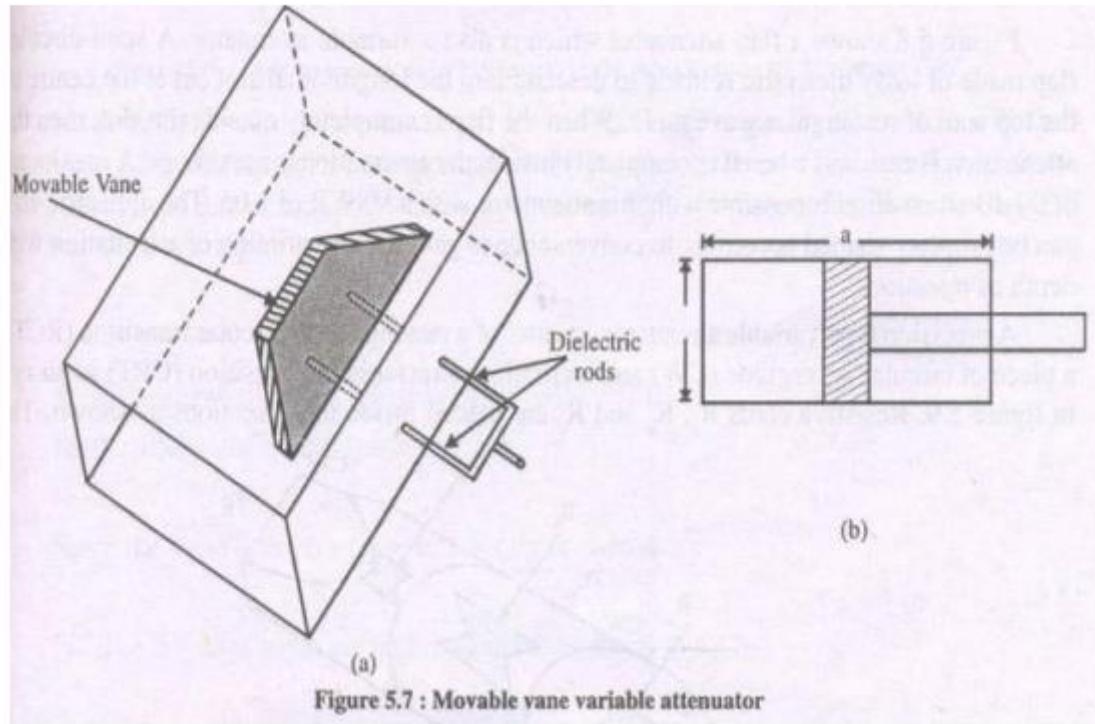
ATTENUATOR



- In order to control power levels in a microwave system by partially absorbing the transmitted microwave signal, attenuators are employed. Resistive films (dielectric glass slab coated with aquadag) are used in the design of both fixed and variable attenuators.
- A co-axial fixed attenuator uses the dielectric lossy material inside the Centre conductor of the co-axial line to absorb some of the Centre conductor microwave power propagating through it. The dielectric rod decides the amount of attenuation introduced. The microwave power absorbed by the lossy material is dissipated as heat









ATTENUATOR



- In waveguides, the dielectric slab coated with aquadag is placed at the centre of the waveguide parallel to the maximum E-field for dominant TE₁₀ mode.
- Induced current on the lossy material due to incoming microwave signal, results in power dissipation, leading to attenuation of the signal.
- The dielectric slab is tapered at both ends up to a length of more than half wavelength to reduce reflections as shown in figure 5.7.



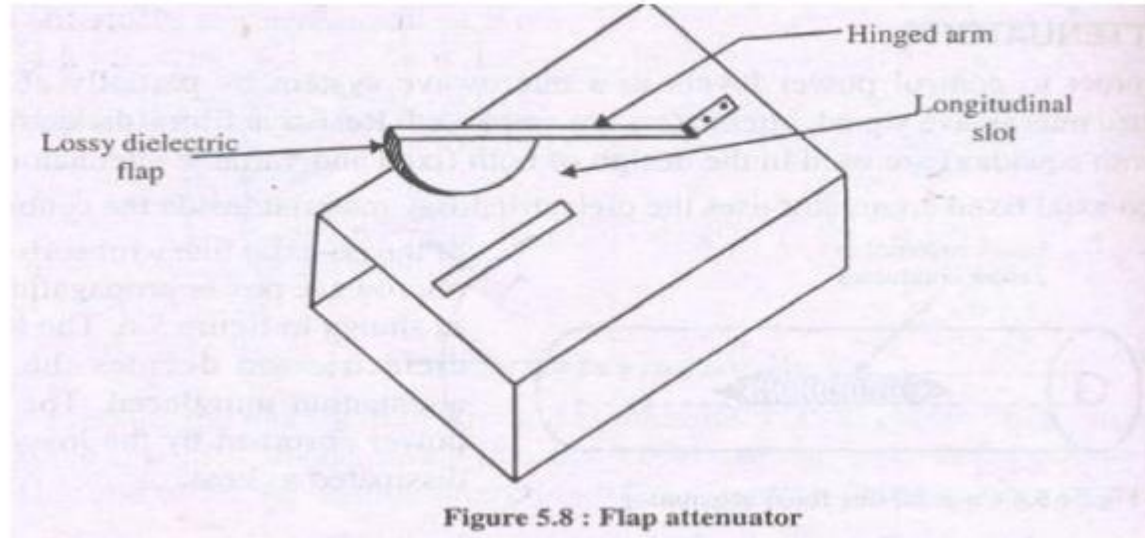


ATTENUATOR



- The dielectric slab may be made movable along the breadth of the waveguide by supporting it with two dielectric rods separated by an odd multiple of quarter guide wavelength and perpendicular to electric field.
- When the slab is at the centre, then the attenuation is maximum (since the electric field is concentrated at the centre for TE₁₀ mode) and when it is moved towards one sidewall, the attenuation goes on decreasing thereby controlling the microwave power coming out of the other port.







ATTENUATOR



- Figure 5.8 shows a flap attenuator which is also a variable attenuator. A semicircular flap made of lossy dielectric is made to descend into the longitudinal slot cut at the centre of the top wall of rectangular waveguide.
- When the flap is completely outside the slot, then the attenuation is zero and when it is completely inside, the attenuation is maximum. A maximum direction of 90 dB attenuation is possible with this attenuator with a VSWR of 1.05.
- The dielectric slab can be properly shaped according to convenience to get a linear variation of attenuation within the depth of insertion.





Thank
you

