DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 19EC602 – Microwave and Optical Engineering

III YEAR / VI SEMESTER

Unit III- MICROWAVE MEASUREMENTS

Topic : Scattering and bending loss

INTRODUCTION

Scattering Losses:

It occurs due to microscopic variations in the material density, compositional fluctuations, structural in homogeneities and manufacturing defects.

Bending Losses:

The loss which exists when an optical fiber undergoes bending is called bending losses. There are two types of bending.

TYPES OF BENDING LOSSESS

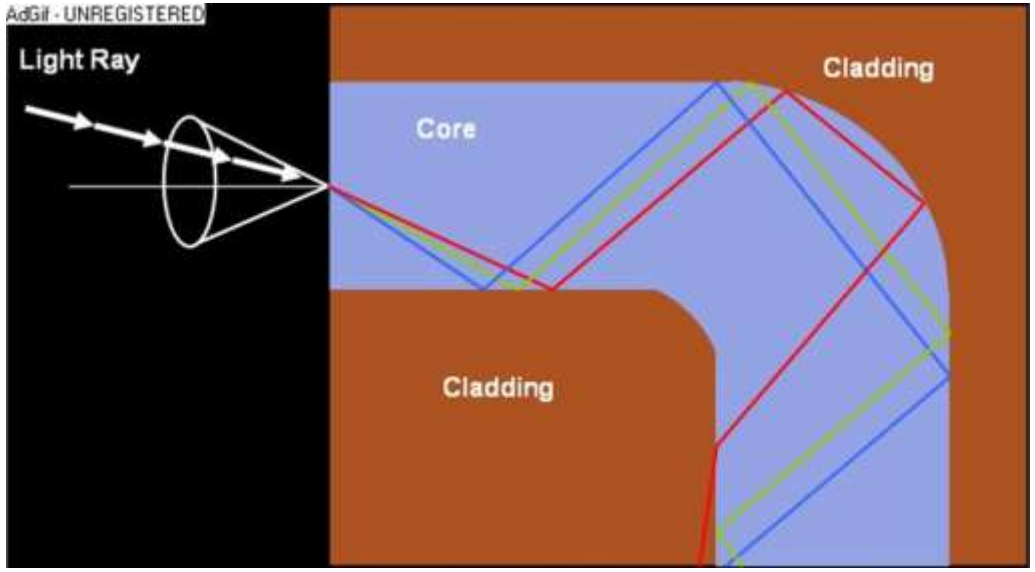
i) Macroscopic bending :

Bending in which complete fiber undergoes bends which causes certain modes not to be reflected and therefore causes loss to the cladding.

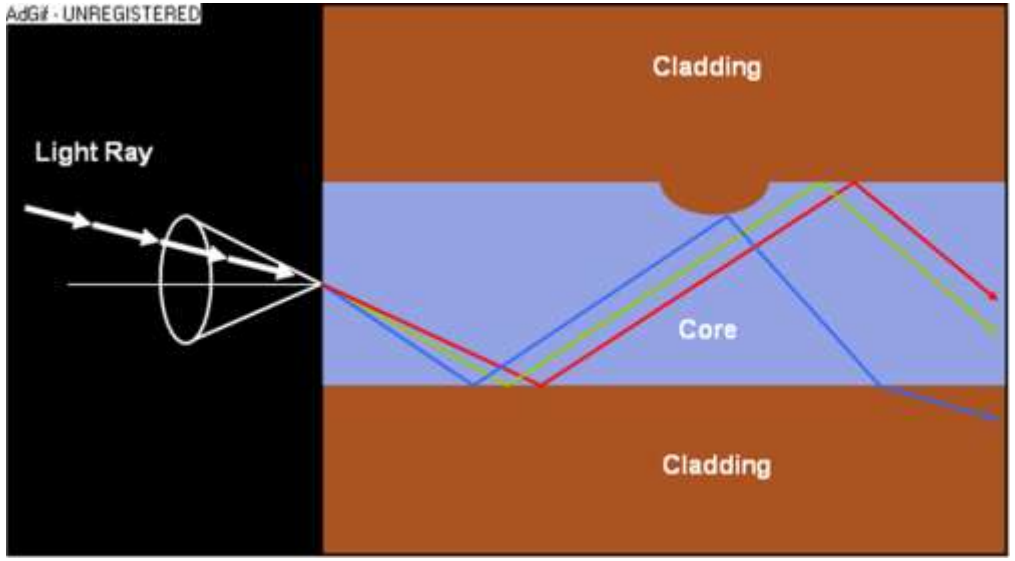
ii) Microscopic Bending :

Either the core or cladding undergoes slight bends at its surface. It causes light to be reflected at angles when there is no further reflection.

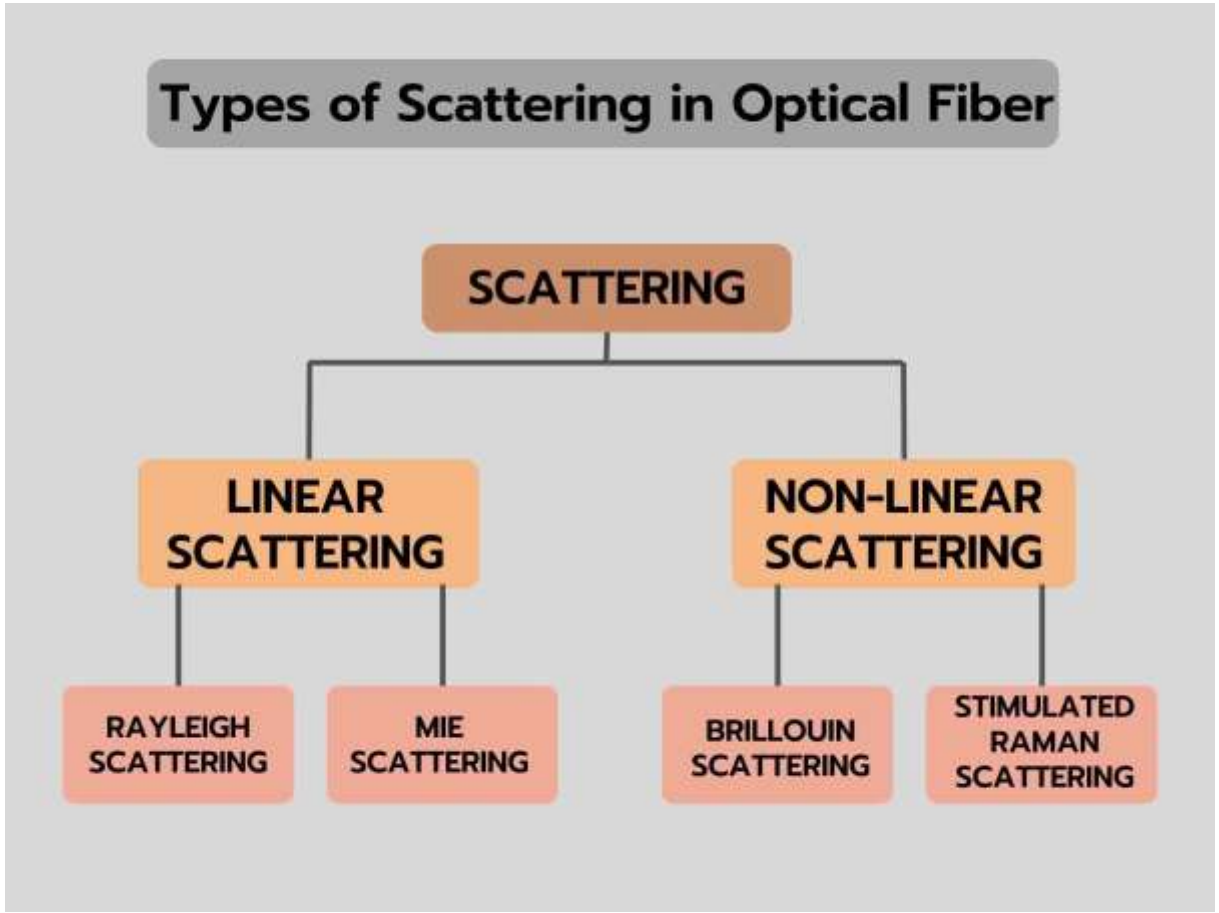
TYPES OF BENDING LOSS



Macroscopic Bending



Microscopic Bending


Types of Scattering in Optical Fiber
SCATTERING
LINEAR SCATTERING
NON-LINEAR SCATTERING
RAYLEIGH SCATTERING
MIE SCATTERING
BRILLOUIN SCATTERING
STIMULATED RAMAN SCATTERING

Scattering Losses:

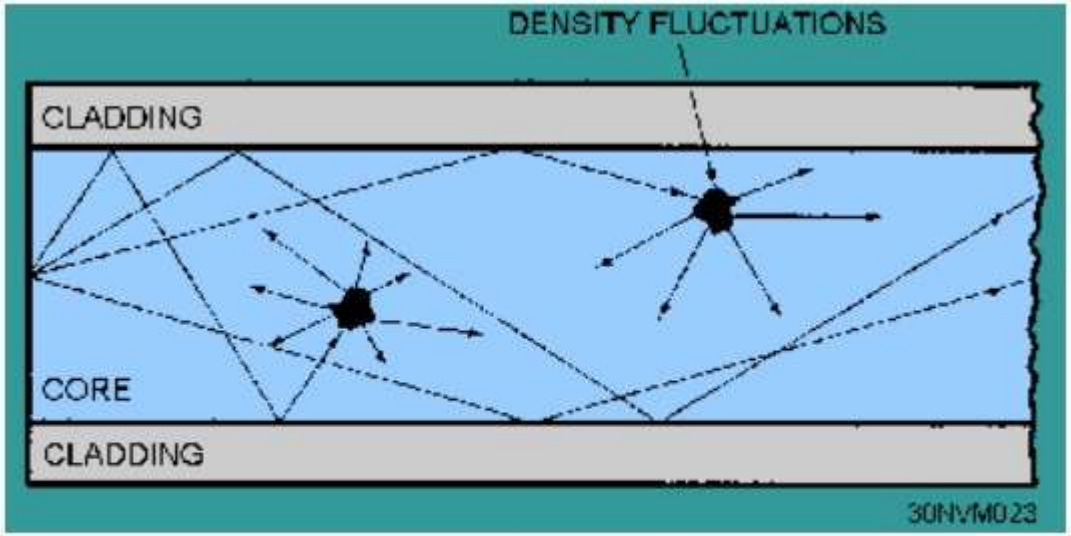


Figure: - 7(Scattering process)

- **Linear Scattering Loss**
- **Non-Linear Scattering Loss**

Linear Scattering mechanism:

- It causes the transfer of some or all of the optical power contained within one propagating mode to be transferred linearly into a different mode.

- This process tends to a result in attenuation of the transmitted light as the transfer may be to a leaky or radiation mode which does not continue to propagate within the fibre core, but is radiated from the fibre. With all linear process there is no change of frequency on scattering.

Non- Linear Scattering Losses:

- This scattering cause disproportionate attenuation, usually at high optical power levels.

- This nonlinear scattering causes the optical power from one mode to be transferred in either the forward or backward direction to the same, or other modes, at a different frequency.

Any Query????

Thank you……