DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 19EC602 – Microwave and Optical Engineering

III YEAR / VI SEMESTER

Unit IV – OPTICAL COMMUNICATION

Topic : Acceptance Angle and Numerical aperture

INTRODUCTION

Acceptance angle:

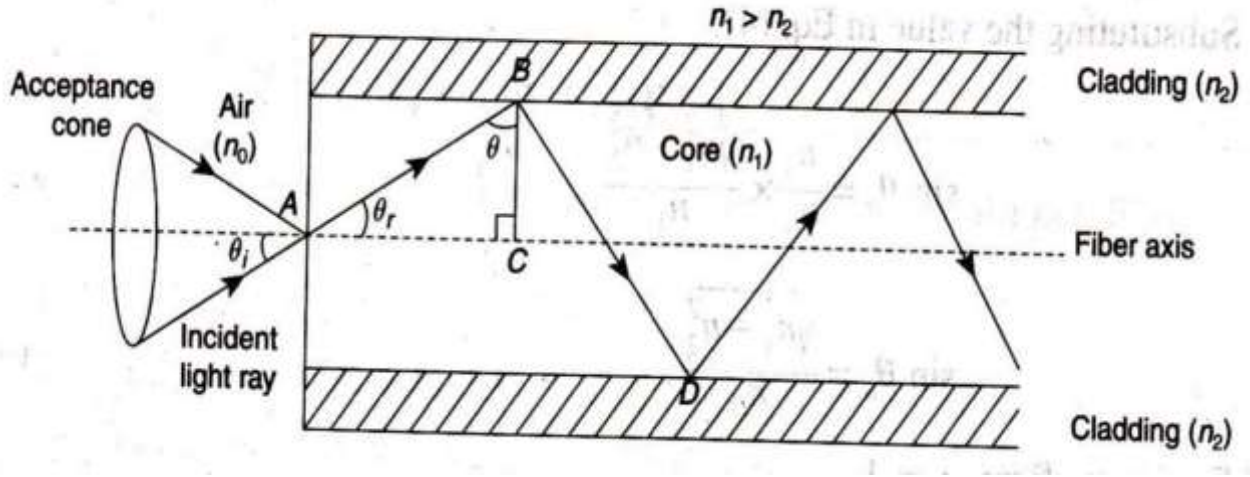
- Half of the angular aperture of an optical system
- Acceptance angle (optical fiber), the angle in an optical fiber below which rays are guided rays
- Acceptance angle (solar concentrator)

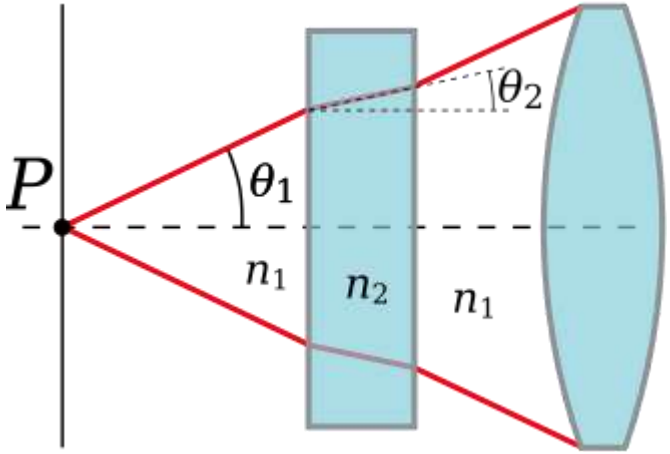
Numerical aperture:

The **numerical aperture** (**NA**) of an optical system is a dimensionless number that characterizes the range of angles over which the system can accept or emit light. By incorporating index of refraction .

Acceptance angle and acceptance cone:

- The maximum angle at which the light can suffers total internal refection is called as acceptance angle.
- The acceptance cone is derived by rotating the Acceptance Angle about the fiber axis.



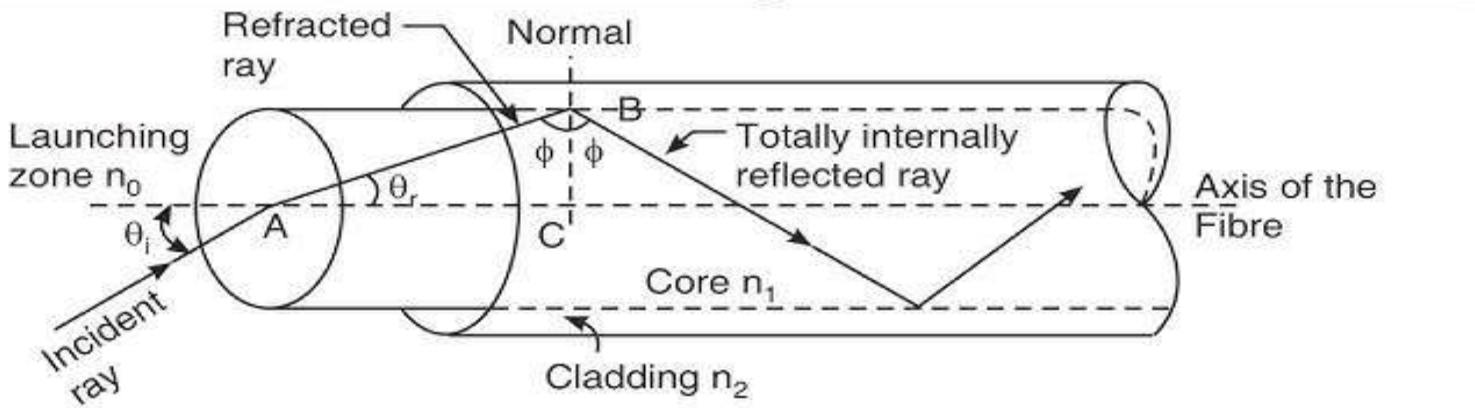


Numerical aperture

$$\mathrm{NA} = n \sin \theta,$$

where *n* is the index of refraction of the medium in which the lens is working (1.00 for air, 1.33 for pure water, and typically 1.52 for immersion oil;[1] see also list of refractive indices), and *θ* is the half-angle of the maximum cone of light that can enter or exit the lens.

Acceptance angle & Numerical aperture



Geometry for the calculation of acceptance angle of the fibre.

APPLICATIONS

- Optical fibre is a hair-like flexible and transparent fibre which is used for the transmission of data signals over large distances with a higher speed.
- Hence optical fibre is used to provide the service of internet, telephone and television etc.
- Optical fibre works on the principle of total internal reflection.

Any Query????

Thank you……