

Objective / Aim of the Experiment

To measure the numerical aperture (NA) of the different cables provided.

Equipment Required

Provided optical cables
Laser emitter
Measurement bench

Theory

Numerical Aperture is defined as the light gathering capability of the fiber. Mathematically it is given by:

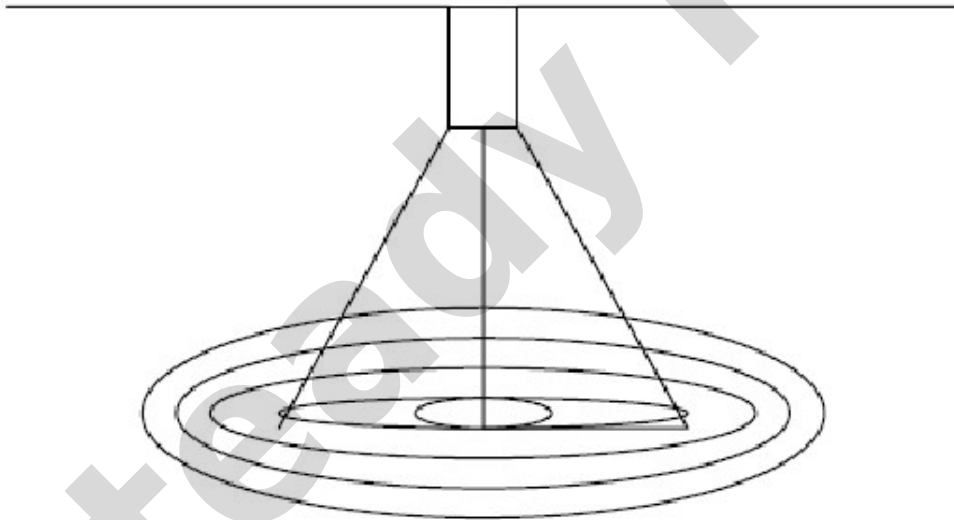
$$NA = \sin \theta_A$$

$$\sin \theta_A = (D/2L)$$

Where:

L is the distance between the cable end and the measurement bench $L = 20\text{mm}$

D is the diameter of the acceptance cone



Procedure

Insert one end of the cable into the laser source (660 nm) and other end into the measuring bench.

Activate the laser source.

Evaluate the diameter of the lightened area.

As we move from cable 3 to cable 5 the brightness of the light point decreases as it is the function of the core diameter and the light become focused at single point.

Observation

(Diameter of each circle is 2 mm)

Cable 3 (200/230) $\hat{\text{A}}\mu\text{m}$ (step index multimode)

D =

NA =

Cable 4 (62.5/125) $\hat{\text{A}}\mu\text{m}$ (graded index multi mode)

D =

NA =

Cable 5 (09/125) $\hat{\text{A}}\mu\text{m}$ (step index single mode)

D =

NA =

Result

It has been observed that as the diameter of the core decreases the NA also decreases as the light gathering capability is the function of core diameter.

D =

NA =

Steady Run