Experiment no. 2

Aim: to study V-number and no. of modes supported by fiber.

Lab Outcome: Analyse the propagation characteristics of optical fiber.

Software: Scilab

Theory: The V number is a dimensionless parameter. It is defined as

$$V = \frac{2\pi}{\lambda} a\left(n_1^2 - n_2^2\right)^{\frac{1}{2}} = \frac{2\pi}{\lambda} a(NA)$$

where λ is the wavelength, a is the radius of the fiber core, and NA is the numerical aperture.

The V number can be interpreted as a kind of normalized optical frequency. It is relevant for various essential properties of a fiber:

1. For V values below ≈ 2.405, a fiber supports only one mode (→ single-mode fibers).
2. Multimode fibers can have much higher V numbers. For large values, the number of supported modes of a step-index can be calculated approximately as

$$M_S = \frac{V^2}{2}$$

And those supported by graded index fiber can be calculated as:

$$M_G = \frac{\alpha}{\alpha+2}\left(\frac{V^2}{2}\right)$$

where alpha is index profile parameter.

Problem statement:

Solve the given problems

Program:

Attach printout of program and output

Conclusion: