(h1) Given the difference in distances traveled and the speed (calculated from the index of refraction of the core), how long does it take the zig-zag ray to travel the length of the fiber?

$$v = \frac{c}{n} = \frac{c}{1.46}$$

$$t' = \frac{L'}{v} = \frac{10.0715\ km}{3 \times 10^5 \frac{km}{s}} \cdot 1.46 = 49.0\ \mu s$$

(h2) How long does it take a ray traveling parallel to the axis to travel the length of the fiber?

$$t = \frac{L}{v} = \frac{10km \cdot 1.46}{3 \times 10^5\ km/s} = 48.7\ \mu s$$

(h3) What is the difference in the travel times, Δt, of the two rays?

$$\Delta t = 3.5 \times 10^{-8}\ sec$$

(h4) Suppose we are sending a series of pulses [square waves, corresponding to digital info sent as a series of 1's and 0's], and the pulses are 1 $\mu s$ apart.

How does this time difference, Δt, compare to the time between pulses?

Is Δt ~~**larger**~~ **(smaller)** **the same** as the time between pulses?

How many times larger/smaller than the time between pulses?

$$\frac{1 \mu s}{3.5 \times 10^{-8} s} = 28.7$$

(i) What does your answer to (h4) tell you about the problem of modal distortion?

that this modal distortion is not a problem if the pulses are μs apart (i.e. Mps rate)
BUT if we want Gigabytes per sec — we can't do it.

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