

RSoft Application: Refractive Index Profile Distortions and Multimode Fiber Links

Cambridge 81-Fibers Statistical Model

Overview

An Ethernet data link designer in Asia needed an efficient simulation-assisted test platform to analyze impact of manufacturing imperfections in refractive index profile of multimode fiber (MMF) links.

The Challenge

Manufacturing imperfections can cause center defects (tips and dips), edge defects, core-cladding interface defects and deviation from parabolic index. A robust design should account for distortions on refractive index profile. Simulation requires scanning over refractive index data files.

The Solution

RSoft™ ModeSYS™ offers a powerful MMF model and an efficient approach for scanning over refractive index data files. ModeSYS provides a Cambridge-81 fiber model that includes a set of pre-determined index defects representative of installed base of MMFs, which allows studies of various offsets and launch conditions.

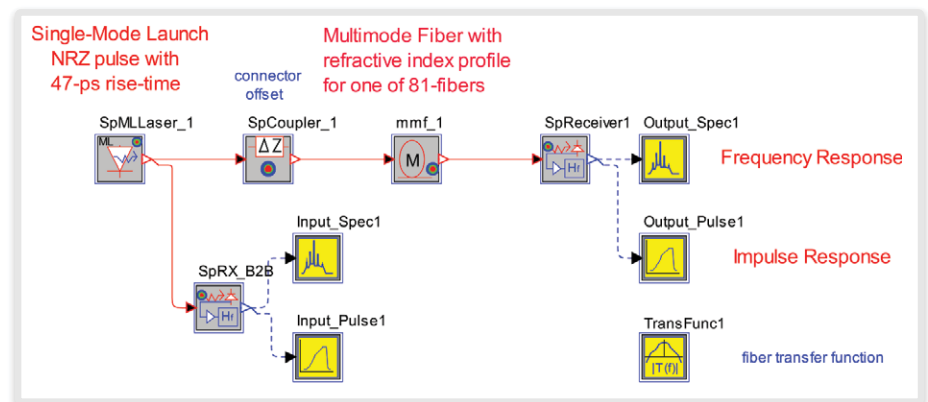


Figure 1. ModeSYS layout for studying impact of fiber index variations on the multimode link bandwidth

The Result

MMF frequency response and modal bandwidth are affected by the defect and launch offset (Figure 2, right). Depending on the launch offset and defect in the refractive index (RI) profile, eye openings vary (Figure 3) consistent with the corresponding frequency response. The ideal parabolic RI profile provides the highest bandwidth, while index profile defects of the fiber preform can significantly reduce modal bandwidth and degrade performance.

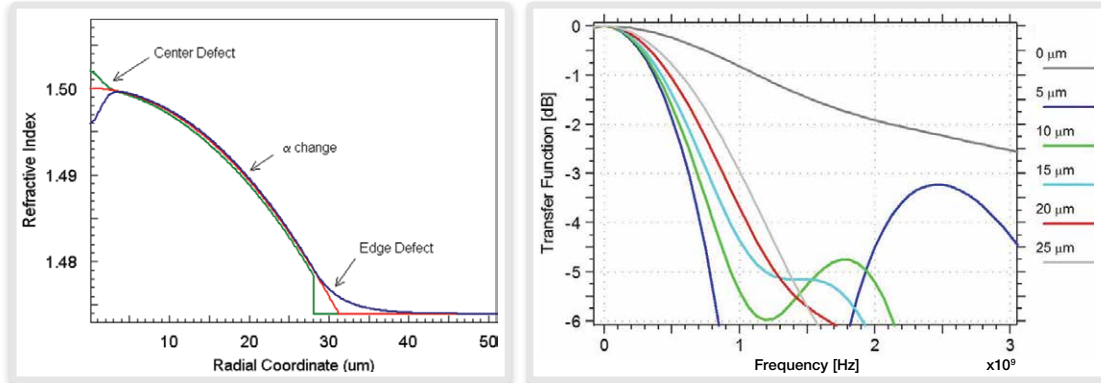


Figure 2. Types of defects in refractive index profile (left) and frequency response of a multimode fiber at different launch offsets

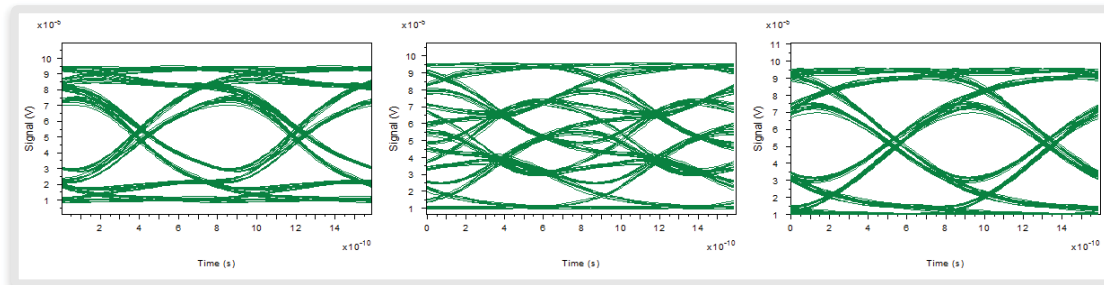


Figure 3. Eye diagrams for link at different launch offsets: 0.5 microns (left), 10 microns (middle) and 15 microns (right)

For more information, please contact Synopsys' Optical Solutions Group at (626) 795-9101, visit <http://optics.synopsys.com/rsoft/>, or send an e-mail to rsoft_sales@synopsys.com.

