

RSoft Application: Collimated Beam Optics-Based Transmitter Packaging

Miniaturized, Structurally Tolerant Design Using ModeSYS and CODE V Cosimulation

Overview

A leading multimode transceiver packaging company in Asia needed robust optical designs that were insensitive to VCSEL-lens-fiber misalignments.

The Challenge

Transceivers for multimode fiber (MMF) interconnects need to be compact, and receptacle packaging has to be structurally tolerant. Adding to the design challenge is the presence of photonic and optical components, which require a mixed ray and spatial field approach for optimization. Synopsys' RSoft™ ModeSYS™ and CODE V® software tools can handle this design challenge.

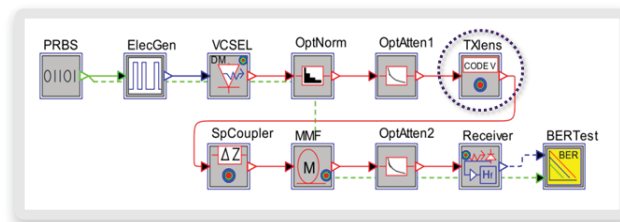


Figure 1. ModeSYS topology for simulating the lens assembly

The Solution

ModeSYS (Figure 1) provides cosimulation with CODE V (Figure 2), enabling mixed-domain analysis. Users can evaluate coupling efficiency and bit error rate (BER) for component misalignments, and then evaluate system BER for variations in component geometry.

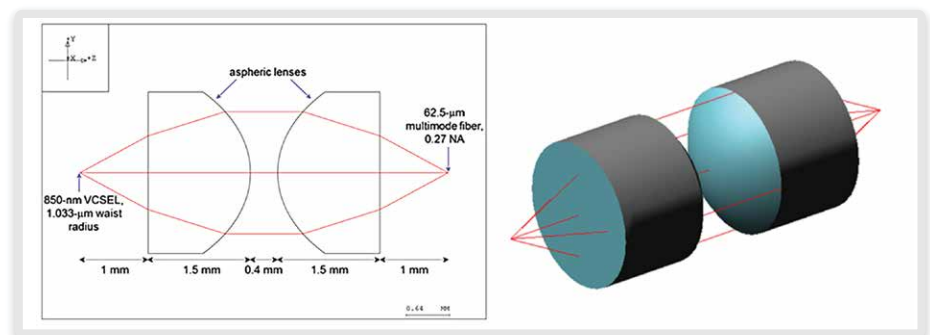


Figure 2. Aspheric lens assembly (left) and 3D rendering of the optimized design in CODE V (right)

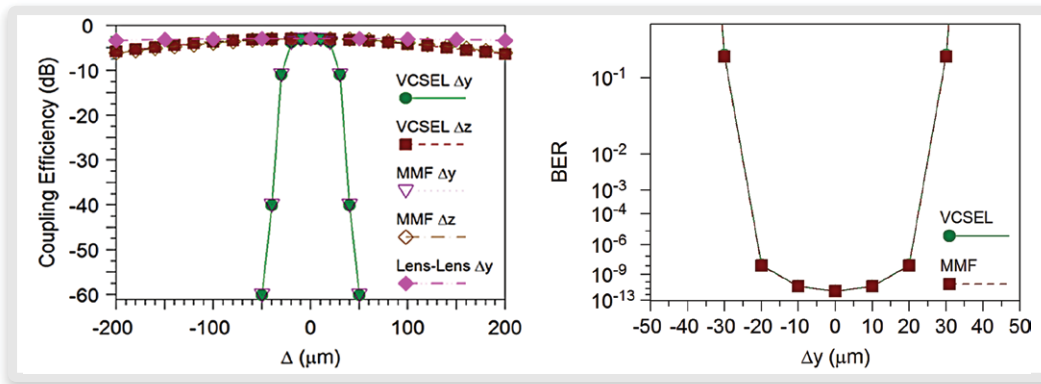


Figure 3. ModeSYS plots of power coupling efficiency (left) and bit error rate (BER) vs. packaging offset (right)

The Result

The mixed-domain analysis using ModeSYS and CODEV cosimulation provided the following insights into the problem and helped obtain an optimal range of tolerances for acceptable performance.

- ▶ Power coupling efficiency is more sensitive to lateral misalignment of the VCSEL or MMF, and exhibits high tolerance to longitudinal misalignments or lens-lens lateral misalignment (Figure 3, left)
- ▶ Significant deterioration in performance when VCSEL or MMF lateral misalignment exceeds 20-microns (Figure 3, right)

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