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# Physical - Optics Investigation of Light Coupling into Fiber and Micro-Optical Sensors

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## **Abstract**

In modern optical metrology systems, fibers and other micro-optical devices are widely used for collecting and monitoring light signals. Such devices are of great help to reduce the size of the detecting units; but on the other side, the design and analysis of systems containing fiber and micro-sensors often requires far beyond the ray-optics based modeling techniques. Because the interaction between light and micro-structures with comparable feature size to the wavelength often requires electromagnetic field solvers. In fact, it requires a complete physical-optics-based modeling technique for the whole optical system, since the coherence and polarization effects must be considered from the source on. In this work, we investigate the coupling of electromagnetic fields into fiber and similar micro-optics structures, and especially, we perform tolerance analysis of given system with respect to shift and tilt of the fiber and micro-optical sensors.