

How to determine single-mode fiber in COMSOL



Overview

In this video, we demonstrate a step-by-step simulation of Single Mode Optical Fiber using COMSOL Multiphysics. You'll learn how to model the fiber structure, set up boundary conditions, select appropriate physics (like Electromagnetic Waves, Frequency Domain), and. Among the wide variety of fibers that exist, one important categorization criterion is if the fiber is multimode or single mode. In a single mode fiber, only one spatial mode can exist. The simulation analytics is divided into two parts, i. simulation through COMSOL, whereby varying the core diameter and wavelength, EM. In this paper we investigate by simulation the dependence of the numerical aperture, normalized frequency and power propagating in the fibre, on the refractive index difference between the cladding and the core. The main purpose of the presented numerical modelling results is developing a simple. Focusing a laser beam onto the tip of a single mode fiber is a common way to couple light. In this model, we use the beam envelopes method to compute a small free-space fiber-fiber. Then, through structured projects, you'll explore how to model, analyze, and visualize fiber modes, including single-mode, multi-mode, double-cladding, and bent fibers, as well as microstructured photonic crystal fibers. What You'll Learn Key Features Projects Covered Mode analysis, V-number.



Article Content

Jul 20, 2025

An Analytical Simulation of Step-Index Single Mode Fiber using COMSOL ...

Date of publication (dd/mm/yyyy): 01/09/2020 Abstract – This Paper is about simulating various results of Step Index Single Mode Fiber, where the standard parameters are according to that of OptiFiber.

Jun 15, 2026

Wave Optics Module Application Library

Today, the silica glass (SiO_2) fiber is forming the backbone of modern communication systems. Single-mode step-index fibers are used for long-haul, even transoceanic, communication, whereas both

Jul 05, 2025

Application of COMSOL Multiphysics for Fiber Beam Profiling

Mode analysis is another important area of knowledge in beam profiling. It provides insights into the modal structure of a fiber optic beam, including the number, shape, and spatial distribution of guided

Jul 18, 2025

COMSOL Multiphysics Application Library

One of the winning devices has been the single-mode fiber, having a step-index profile with a higher refractive index in the center core and a lower index in the outer cladding. Numerical software plays

Nov 30, 2025

COMSOL 6.3

Among the wide variety of fibers that exist, one important categorization criterion is if the fiber is multimode or single mode. In a single mode fiber, only one spatial

Sep 02, 2025

An Analytical Simulation of Step Index Single Mode Fiber Background ...

This Paper is about simulating various results of Step Index Single Mode Fiber (SISMF), where the standard parameters are according to that of optical fiber. By varying core diameter and

Oct 12, 2025

Modelling Of Optical Waveguide Using COMSOL Multiphysics

The main purpose of the presented numerical modelling results is developing a simple method of investigating performance and optimization of single mode fibres.

Nov 11, 2025

An Analytical Simulation of Step-Index Single Mode Fiber using

Overall, on the basis of simulation results given by COMSOL and Optifiber different parameters for a single mode step index fiber is studied and well analysed. These results give deep insight into the

Dec 10, 2025

COMSOL Multiphysics Software Video for Single mode

COMSOL Multiphysics Software Video for Single mode fiber, Creating by Kangkan Vokto From Electronics and Communication Engineering (ECE) Discipline of

Oct 03, 2025

Mode Analysis for Electromagnetic Waveguides in

Mode analysis is an essential tool in radiofrequency and wave optics calculations. Learn how to carry out this type of study here.

Nov 23, 2025

Single Mode Fiber-to-Fiber Coupling

Focusing a laser beam onto the tip of a single mode fiber is a common way to couple light. To achieve good coupling efficiency, the spatial mode of the light field has to match the spatial mode of the fiber.

Apr 29, 2026

COMSOL 6.4

Single Mode Fiber-to-Fiber Coupling Introduction Optical fibers can be used to efficiently transmit optical signals over large distances with minimal losses. Among the wide variety of fibers that exist, one

Jun 02, 2026

Single Mode Fiber-to-Fiber Coupling

Introduction Optical fibers can be used to efficiently transmit optical signals over large distances with minimal losses. Among the wide variety of fibers that exist, one important categorization criterion is if

May 17, 2026

COMSOL ® Design Tool: Simulations of Optical Components Tutorial

How can you assign the nomenclature of each mode ? Which ones are TE? TM? EH/HE? What are the values for n and m? Enjoy 😊

Jun 30, 2025

Single Mode Fiber-to-Fiber Coupling

To achieve good coupling efficiency, the spatial mode of the light field has to match the spatial mode of the fiber. In this model, we use the beam envelopes method to compute a small free-space

Oct 27, 2025

Modelling Of Optical Waveguide Using COMSOL Multiphysics

In this paper, we demonstrate the use of FEM method in studying the behavior of single mode optical fibres using COMSOL Multiphysics® (version 4.3), a commercial software package . In this study

Mar 06, 2026

#1 How to design Single mode fiber optic using

Hello Engineers, This is the first video in the channel and it is about how to design a step-index single-mode optical fiber and find the mode field

Dec 07, 2025

#2 How to design a multi mode optical fiber (COMSOL ...

Hello Engineers, This video is about how to design a step-index multi-mode optical fiber and find the mode field profiles MDF at the wavelength of 1550 nm.

Feb 24, 2026

Single Mode Fiber 2D cross-section in COMSOL

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Feb 02, 2026

COMSOL Multiphysics Application Library

Today, the silica glass (SiO₂) fiber is forming the backbone of modern communication systems. Single-mode step-index fibers are used for long-haul communication, including transoceanic. Both graded

Oct 31, 2025

RF Module Model Library

One of the winning devices has been the single-mode fiber, having a step-index profile with a higher refractive index in the center core and a lower index in the outer cladding. Numerical software plays

Dec 23, 2025

COMSOL ® Design Tool: Simulations of Optical Components Tutorial

Optical Fiber: Modes distribution in fiber TE or TM: no E or H field in the propagation direction (like in a waveguide)

Apr 01, 2026

Single Mode fiber simulation on COMSOL

In this video, we demonstrate a step-by-step simulation of Single Mode Optical Fiber using COMSOL Multiphysics.

Contact Us

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