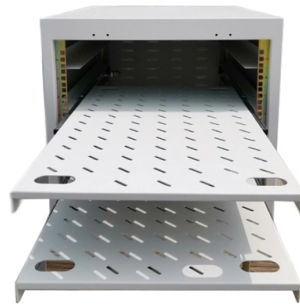


COMSOL s magneto-optical modulator



Overview

This project focuses on the design and simulation of a Mach-Zehnder Interferometer (MZI) based optical modulator using COMSOL Multiphysics. The objective is to analyze phase modulation, interference-based switching, and voltage-controlled optical transmission in integrated photonic. The Wave Optics Module, an add-on to the COMSOL Multiphysics® software platform, is used by engineers and scientists to understand, predict, and study electromagnetic wave propagation and resonance effects in optical applications. Electro-optical sensors for measuring the electric field to become the main method due to the crystal optical fiber preparation and mature technology. The results show a value for cross-sensitivity of 3.27 mT/°C in a non-optimized configuration of the sensor and of 2. To control the optical properties with an. In 1875, John Kerr placed current-carrying coils in holes on either side of a glass slab, which created an electric field.



Article Content

Jul 15, 2025

Multi-Physics Modeling and Simulation of Electro-Optical

This article describes the basic principles that Mach - Zehnder of lithium niobate optical modulator for electric field measurements signing the Mach - Zehnder

Mar 07, 2026

Computational Electromagnetics Modeling: Which

Wondering what COMSOL module to use for your computational electromagnetics modeling? The AC/DC, RF, Wave Optics, and MEMS modules explained

Aug 18, 2025

Mach-Zehnder Modulator Simulation Guide | PDF

This model simulates a Mach-Zehnder modulator using COMSOL Multiphysics. The modulator consists of an input waveguide that splits into two parallel waveguides,

Jan 02, 2026

Magneto-optic in-fiber micro modulator

In this section we experimentally demonstrate the proposed magneto optical in-fiber modulator. Fig. 5 depicts the preliminary experimental validation of the proposed approach.

Sep 16, 2025

All-optical nonlinear activation function based on a Mach-Zehnder ...

The utilization of MO modulation for achieving optical nonlinear activation function represents a significant advancement over electro-optical and thermo-optical techniques. This method boasts a

Apr 26, 2026

The Magneto-Optic Modulator

Since the magneto-optic modulator has low impedance, the scientists hope it will be able to better interface with superconductor circuits. The team also took steps to make their modulator as

Jun 19, 2026

Computational Modeling of Magnetic Field Optical Fiber

With this panorama, this work analyzes through computational modeling a fiber optical magnetic field sensor, using the magneto-optical Faraday

May 05, 2026

Research on the Modeling of the Faraday Effect Based

In this paper, magneto-optical sensing system based on Faraday effect is applied in the measurement of the electric current and the principles and simulation models

Feb 27, 2026

Can anyone help me with magneto optical simulation

I am trying to simulate the magneto-optic Kerr effect for a nanoparticle, using the relative permittivity tensor, which the magnetic effect comes to off-diagonal terms

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(PDF) Magneto-optical modulator for superconducting

The magneto-optic effect has a wide range of applications for the fabrication of microstructure devices, such as modulator, circulator, isolator,

Oct 28, 2025

Micromagnetic Simulation with COMSOL Multiphysics®

Read about how a guest blogger built a "Micromagnetics Module" in COMSOL Multiphysics® to study magneto-dipolar couplings, magneto-elastic

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Wave Optics Module Application Gallery Examples

Learn how to use the Wave Optics Module to model photonic devices and optical waveguides. Browse and download tutorial models and example apps.

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Join the Conversation

The COMSOL discussion forum covers a wide variety of simulation topics. Browse the threads and share your ideas with the COMSOL community.

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Neha-photonics/Mach-Zehnder-Modulator-Simulation-using-COMSOL

This project focuses on the design and simulation of a Mach-Zehnder Interferometer (MZI) based optical modulator using COMSOL Multiphysics. The objective is to analyze phase

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Modeling Ferromagnetic Materials in COMSOL

Modeling Ferromagnetic Materials Using COMSOL Multiphysics® Next, let's consider an example that shows that different laws can be used for the

Apr 21, 2026

Wave Optics Module Application Library

The acousto-optic effect can be used for modulation of laser beam power or frequency or for deflection of a laser beam. An acousto-optic modulator (AOM) is a device that modulates the power of the laser

Mar 18, 2026

Design and optimization of integrated Mach-Zehnder modulators in X

A Mach-Zehnder electro-optic modulator (MZM) was designed using AFM COMSOL software and fabricate using pulse laser deposition method in this work. A successful multilayer

Nov 25, 2025

Simulation of Stress-Optic Microresonator Modulator

Despite several successful experimental demonstrations, there lacks a systematic procedure in designing and optimizing the piezo-actuated stress-optic microresonator modulators. In this work, we

Feb 24, 2026

Multiphysics Modeling of Electro-Optic Devices

The flexibility of COMSOL Multiphysics makes it possible to construct unified models of EO phenomena including realistic waveguide profiles and anisotropic material

May 16, 2026

Wave Optics Module Application Library

This application shows how the Electromagnetic Waves, Beam Envelopes interface can be combined with the Electrostatics interface to perform simulations of the properties of an optical waveguide

Jun 03, 2026

Mach-Zehnder Modulator Simulation Guide | PDF

The document describes the design and simulation of a Mach-Zehnder modulator using COMSOL Multiphysics 6.0, focusing on its operation as an optical

May 07, 2026

How to Model Linear and Nonlinear Optics in the

Get a comprehensive guide to modeling linear and nonlinear optics in COMSOL Multiphysics®. Topics discussed include first-, second-, and third-order

Dec 09, 2025

The Magneto Optic Modulator

However, these modulators usually have high electrical impedance — they resist the flow of alternating current — making them a poor match for

Jun 16, 2026

Mach-Zehnder Modulator

A Mach-Zehnder modulator is used for controlling the amplitude of an optical wave. The input waveguide is split up into two waveguide interferometer arms. If a

May 20, 2026

Guidance on Setting Up Ring Modulator Simulation (Semiconductor

Hello everyone, I am currently working on simulating a silicon microring modulator and would appreciate some guidance. My ultimate goal is to analyze the device's electrical and optical

May 10, 2026

Multi-Physics Modeling and Simulation of Electro-Optical

With the rapid development of UHV technology, Electric field measurement technique has attracted lots of people's attention. Electro-optical sensors for

May 23, 2026

Title: A low-power integrated magneto-optic modulator on silicon

So far, only electro-optic modulators have been shown to work at low temperature³⁻⁸, and the use of magneto-optic effects in integrated optics has been limited to optical isolators and circulators^{12,13},

Dec 07, 2025

How to Model Linear and Nonlinear Optics in the

In COMSOL Multiphysics, the Pockels effect has been demonstrated using an optical modulator. In this model, light propagates through a single silicon

Contact Us

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