



Comsol Optical Waveguide Simulation

Salah Obayya



Comsol Optical Waveguide Simulation:

Optical Waveguides and Devices Modeling and Visualization Using COMSOL Multiphysics Volume 1 Hee Lim, 2018-10-19 This pictorial manuscript is a step by step graphical illustrations for waveguides and devices modeling and computational physics simulation using COMSOL Multiphysics with Ray Optics Wave Optics and AC DC Electrostatics modules All the example models investigated and visualized with the help of Finite Element Analysis are referenced from the standard USA undergraduate text on Optical Guided Waves and Devices by Richard Syms and John Cozens The simulations include the use of geometrical ray tracings for point source and full electromagnetic waves source employing the Maxwell s wave equations for plane wave input Both 2D and 3D simulation results will help in visualize the electromagnetic field propagating inside the waveguides and devices Readers without fundamental handle on optics modeling are suggested to read the Optics Modeling and Visualization with COMSOL Multiphysics A step by step graphical instruction manuscripts for detailed discussion These models may be expanded to post graduate research and industrial photonics waveguides and devices development There are 46 chapters of different 2D and 3D optical waveguides devices structures modeled and simulated in Volume 1 and 2 Volume 1 models include 3D single mode optical fiber planar waveguide channel waveguide longitudinal and transverse phase modulator surface plasmon optical square waveguide tapered waveguide FTIR beamsplitter in ray tracing and electromagnetic wave solvers full prism coupler halved prism coupler plano convex overlay lens overlay Luneburg lens geodesic lens with control setup for resulted electric field comparison corrugated gratings transmission and reflection gratings chirped grating lens beam expander grating grating coupler chirped grating coupler buried channel waveguide Volume 2 models continue with the ridge channel waveguide strip loaded channel waveguide GaAs GaAlAs planar waveguide GaAs GaAlAs heterostructure waveguide radiation leaks at fiber bend radiation leaks at waveguide bend c axis Calcite polarizer waveguide integrated optic normal reflector horn channel waveguide Y Junction waveguide optical phase modulator cut off modulator electro optic Mach Zehnder interferometer waveguide parallel coupling waveguide electro optic directional coupler single polished fiber directional coupler double polished fiber directional coupler tunable coupling strength of polished double fiber coupler cross sectional coaxial fiber coupler 2D directional coupler with tapered coupling corrugated reflection gratings optical fiber grating on half polished fiber coupler and track changing reflector with grating assisted coupling fiber

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employing the Maxwell's wave equations for plane wave input. Both 2D and 3D simulation results will help in visualize the electromagnetic field propagating inside the waveguides and devices. Readers without fundamental handle on optics modeling are suggested to read the Optics Modeling and Visualization with COMSOL Multiphysics. A step by step graphical instruction manuscripts for detailed discussion. These models may be expanded to post graduate research and industrial photonics waveguides and devices development. There are 46 chapters of different 2D and 3D optical waveguides devices structures modeled and simulated in Volume 1 and 2. Volume 1 models include 3D single mode optical fiber planar waveguide channel waveguide longitudinal and transverse phase modulator surface plasmon optical square waveguide tapered waveguide FTIR beamsplitter in ray tracing and electromagnetic wave solvers full prism coupler halved prism coupler plano convex overlay lens overlay Luneburg lens geodesic lens with control setup for resulted electric field comparison corrugated gratings transmission and reflection gratings chirped grating lens beam expander grating grating coupler chirped grating coupler buried channel waveguide. Volume 2 models continue with the ridge channel waveguide strip loaded channel waveguide GaAs GaAlAs planar waveguide GaAs GaAlAs heterostructure waveguide radiation leaks at fiber bend radiation leaks at waveguide bend c axis Calcite polarizer waveguide integrated optic normal reflector horn channel waveguide Y Junction waveguide optical phase modulator cut off modulator electro optic Mach Zehnder interferometer waveguide parallel coupling waveguide electro optic directional coupler single polished fiber directional coupler double polished fiber directional coupler tunable coupling strength of polished double fiber coupler cross sectional coaxial fiber coupler 2D directional coupler with tapered coupling corrugated reflection gratings optical fiber grating on half polished fiber coupler and track changing reflector with grating assisted coupling fiber.

Methods and Applications for Modeling and Simulation of Complex Systems Fazilah Hassan, Noorhazirah Sunar, Mohd Ariffanan Mohd Basri, Mohd Saiful Azimi Mahmud, Mohamad Hafis Izran Ishak, Mohamed Sultan Mohamed Ali, 2023-10-12. This book constitutes the refereed proceedings of the 22nd Asia Simulation Conference on Methods and Applications for Modeling and Simulation of Complex Systems AsiaSim 2023 held in Langkawi Malaysia during October 25-26, 2023. The 77 full papers included in this book were carefully reviewed and selected from 164 submissions. They were organized in topical sections as follows: Modelling and Simulation, Artificial intelligence, Industry 4.0, Digital Twins, Modelling Simulation and Gaming Simulation for Engineering Simulation for Sustainable Development, Simulation in Social Sciences.

Computational Nanophotonics Sarhan Musa, 2018-10-08. This reference offers tools for engineers, scientists, biologists and others working with the computational techniques of nanophotonics. It introduces the key concepts of computational methods in a manner that is easily digestible for newcomers to the field. The book also examines future applications of nanophotonics in the technical industry and covers new developments and interdisciplinary research in engineering science and medicine. It provides an overview of the key computational nanophotonics and describes the technologies with an emphasis on how they work and their key benefits.

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Computational Photonics Salah Obayya,2011-06-20 This book explores the state of the art in computational modelling techniques for photonic devices In this book the author provides a comprehensive coverage of modern numerical modelling techniques for designing photonic devices for use in modern optical telecommunications systems In addition the book presents the state of the art in computational photonics techniques covering methods such as full vectorial finite element beam propagation bidirectional beam propagation complex envelope alternative direction implicit finite difference time domain multiresolution time domain and finite volume time domain The book guides the reader through the concepts of modelling analysing designing and optimising the performance of a wide range of photonic devices by building their own numerical code using these methods Key Features Provides a thorough presentation of the state of the art in computational modelling techniques for photonics Contains broad coverage of both frequency and time domain techniques to suit a wide range of photonic devices Reviews existing commercial software packages for photonics Presents the advantages and disadvantages of the different modelling techniques as well as their suitability for various photonic devices Shows the reader how to model analyse design and optimise the performance of a wide range of photonic devices by building their own numerical code using these methods Accompanying website contains the numerical examples representing the numerical techniques in this book as well as several design examples http://www.wiley.com/go/obayya_computational This book will serve as an invaluable reference for researchers optical telecommunications engineers engineers in the photonics industry PhD and MSc students undertaking courses in the areas of photonics and optical telecommunications will also find this book of interest

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