

Fiber Bragg Grating Sensor Simulation



Overview

FBG_SiMul V1.0 is a tool to study and design the implementation of fibre Bragg grating (FBG) sensors solutions in any arbitrary loaded structure or application. The software removes the need for a fibre optic expert user and makes the. FBG_SiMul V1.0 is a tool to study and design the implementation of fibre Bragg grating (FBG) sensors solutions in any arbitrary loaded structure or application. The software removes the need for a fibre optic expert user and makes the sensor response of a structural health monitoring solution using FBG sensors more simple and fast. The software uses a modified T-Matrix method to simulate the FBG reflected spectrum based on the stress and strain from a finite element method model. The article describes the theory and algorithm implementation, followed by an empirical validation.

- Fibre Bragg grating
- FBG output simulation
- FBG sensing solution design
- FBG implementation
- FBG optimization
- Code metadata

More demanding structural applications and new design philosophies are increasingly motivating engineers and researchers to implement sensors into structures and to develop new structural health monitoring (SHM) solutions. This opportunity is driven by new low-cost sensors and transducers, new electronics and new manufacturing techniques. In particular, the cost of fibre Bragg grating (FBG) sensors has dropped over the last few years and robust fibre-optic monitoring systems suitable for SHM have become commercial off the shelf hardware. However, the sustainment of structures using these permanent on-board health monitoring systems is a complex and multi-disciplinary technological field that requires a holistic approach that cannot be address. The shape and response of the FBG reflected spectrum (measured signal) depends on the way that the grating is deformed, i.e., the stress and strain field acting along the grating define the signal response. The FBG response simulation based on the stress and strain state from a finite element method (FEM) model was only recently addressed. Hu et al. developed a Matlab code to simulate the FBG res...

Article Content

Jan 08, 2026

FBG_SiMul V1.0: Fibre Bragg grating signal simulation tool for finite ...

FBG_SiMul V1.0 is a tool to study and design the implementation of fibre Bragg grating (FBG) sensors solutions in any arbitrary loaded structure or application.

Apr 09, 2026

Simulation and Modeling of Fiber Bragg Grating Sensors

In this work theoretical modeling of FBG sensors working is initially discussed to list out modeling parameters deployed in simulation.

May 23, 2026

FBG Fiber Bragg Grating | Photonics Simulation | Optiwave

Simulate a Fiber Bragg Grating (FBG) accurately with OptiGrating. Build industry-grade Fiber Bragg Grating sensors and more with Optiwave, get started today!

Apr 06, 2026

Coupled mode theory analysis and scilab simulation of fiber bragg ...

The present study investigated the temperature sensing characteristics of Fiber Bragg Gratings (FBGs) through a theoretical framework based on Coupled Mode Theory (CMT) and validated the analysis ...

Sep 05, 2025

Simulation of Fiber Bragg Grating Using Different Physical ...

For this project, the strain response of the optical FBG sensor is measured using Optiwave software with different parameters. It is shown that the various parameters represent one of the critical parameters ...

Feb 21, 2026

Numerical Simulation Methods Applied at Fiber Grating Sensors Design

The paper presents the results obtained in simulation of fiber Bragg grating (FBG) and long-period grating (LPG) sensors and their applications. The optical properties of FBG and LPG are ...

Jun 06, 2026

Fiber Bragg gratings

In this topic, we demonstrate how to simulate fiber Bragg grating (FBGs) using MODE". The FBG is constructed with an effective index of 1.5, and a periodic variation of $1e-3$ in the refractive index of the ...

Jul 17, 2026

Fiber Bragg Gratings – FBG, index modulation, filters, fiber-optic sensors

Fiber Bragg gratings are reflective structures in the core of an optical fiber with a periodic or aperiodic perturbation of the effective refractive index.

Apr 04, 2026

Simulation and Experiment of Tilted Fiber Bragg Grating Humidity ...

To address these issues, this study proposes a novel tilted fiber Bragg grating (TFBG)-based optical fiber humidity sensor, coated with a composite film of polyvinyl alcohol (PVA) and ...

May 29, 2026

Fiber Bragg Grating Bend Sensor – Ansys Optics

In this example, a bend sensor based on fiber Bragg grating (FBG) is demonstrated. The change of both physical length and strain-dependent refractive index of the fiber, are calculated by altering the bend ...

May 25, 2026

Fiber Bragg Gratings – FBG, index modulation, filters, ...

Fiber Bragg gratings are reflective structures in the core of an optical fiber with a periodic or aperiodic perturbation of the effective refractive index.

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