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Design,fabrication and FEM simulation of a novel Optical-MEMS sensor[1] VAIBHAV MATHUR, JIN LI, WILLIAM GOODHUE, Photonics center,University of Massachusetts,Lowell, PHOTONICS CENTER TEAM — Optical waveguides are used in a variety of telecommunications systems to route, add or drop optical signals from the network. Here a combination cantilever/waveguide structure is proposed as the core element of either a vibration/shock sensor or light modulator. An AlGaAs layered dielectric waveguide is fabricated on GaAs substrates and undercut to form a suspended beam. The suspended AlGaAs waveguide is micro-cleaved to produce cantilever segments of equal or unequal lengths, corresponding to either the same or different fundamental frequencies resonance (as the natural frequency is a function of length).The sample is vibrated using a piezo driver. If the vibration frequency supplied to the chip is near one of the resonances the waveguide becomes periodically misaligned as the cantilever displacement amplitude builds up causing a periodic loss in signal at the output end of the guide. In this work cantilever/waveguide structures are fabricated and a detailed FEM(Finite element method) analysis of the device carried out. Also wave propagation and subsequent optical misalignment simulation is carried out on the FEM based COMSOL Multiphysics Package.

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