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Modelling and Simulation of Bragg-Grating Structures in Optical Waveguides

*ABSTRACT - Masterthesis*

Bragg gratings are essential optical components widely used as waveguide devices for spectral filtering, dispersion compensation, wavelength tuning and sensing in optical communications and optoelectronics. In this thesis work, the characteristics of Bragg grating structures in optical fibers and waveguides are to be investigated theoretically. The coupled mode theory is to be used to model the light propagation and to enable the analysis of Bragg grating structures. Different structures like uniform grating and non-uniform gratings, apodized grating, chirped grating, phase shifted grating and sampled grating are to be described and modelled using a programming tool (Matlab). The investigations are to be discussed with a detailed systematic analysis of characteristics, numerical simulations and presentation of the results in numerical and graphical way. The reflection and transmission spectra, phase group delay and dispersion are to be analyzed depending on physical grating parameters like grating length, refractive index, index modulation, waveguide structure and others. The objective is to develop a Bragg-grating simulation module which can be used in an overall system simulation tool.