Diploma thesis abstract

«Optical beam focusing by its reflection at one-dimensional gradient photonic crystal»

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The present work covers a theoretical study of an optical beam interaction with a photonic crystal with varying under the exponential law period. A beam focusing and Goos—Hänchen shift at a reflection from such structures are considered. Dependencies of a complex reflection coefficient phase and of its first derivatives on parameters of a photonic crystal and angle of incidence are discussed for the purpose of focusing possibility research. An originality of the work is conditioned by the originality of the scientific problem under consideration, in particular the problem of reflected beam focusing control by the use of a crystal with a variable period.

The existence of maximizing the second derivative of complex reflection coefficient phase range of parameters is shown. The existence of several photon band gaps with various complex reflection coefficient phase profiles corresponding various maximal distances of the best focusing is shown. The Goos—Hänchen shift dependence on crystal parameters is studied. The numerical and analytical solutions of the paraxial and not paraxial optical beams reflection are carried out. The numerically received shift values for crystals with varying under the exponential law period exceed the values observed in experiment for periodic photonic crystals several times.