

Diploma thesis abstract

Generation and interaction of light beams containing polarization singularities in isotropic media with spatial dispersion of nonlinear optical response

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The subject of the presented work refers to two branches of optical physics: nonlinear and singular. The objects of research are inhomogeneously polarized light beams containing polarization singularities — special points where the polarization ellipse degenerates into a circle. Classical problems of nonlinear optics such as sum-frequency generation, second harmonic generation and the self-focusing of light in isotropic media with nonlocal nonlinear response were solved using a combination of analytical and numerical methods. Previous research in this field has demonstrated that even in cases of homogeneously polarized fundamental beams, the signal beam with highly inhomogeneous transversal polarization distribution is formed and it can contain polarization singularities. In the presented work fundamental beams initially containing polarization singularities are considered, nonlinear transformation of their topological characteristics is studied and the possibility of controlling the singular structure of signal beams is discussed.