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Abstracts

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This book contains the materials on the fundamental and applied problems of pulsed lasers. It may be interesting for researches and engineers working in the sphere of quantum electronics, spectroscopy, plasma physics, medicine, remote sensing and laser technologies.

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with respect to the input surface of the ceramic samples and computer modeling of these processes on the basis of the nonlinear Schredinger equation with the inhomogeneity of the medium.

Lithium fluoride ceramic samples, we obtained bv pressing a single crystal of lithium fluoride in a mechanical press with heating of the initial sample by gas flame to a temperature near to the melting temperature used for experimental studies. The experimental setup for radiation ceramics femtosecond laser radiation include titanium-sapphire laser generating pulses of 50 fs with an energy of about 6 mJ and the maximum spectral emission line at a wavelength of 950 nm. In the experiments, the so-called lowaperture focus regime is used when the exciting laser light focused by a lens with a long focal length – 425 mm, and the sample was placed at a distance L before the location of the focus of the lens.

The simulation results are qualitatively describes the experimental dependence of the self-focusing length of the lens position. In the first approximation, the dependence of the self-focusing length l of the distance L between the input surface and the focus lens is linear. When L tends to zero, i.e. when the lens focus approaches to the sample surface, the self-focusing length also tends to zero. The length of the self focusing of the single crystal is higher, according to the simulation. This is explained by more rapid disintegration of the laser pulses to the filaments in the case of ceramics, where the initial of heterogeneity in the profile beam enhanced environments heterogeneous.

The studies showed that luminescent defects ere efficiently created in the irradiated samples. It is distributed along the threadlike channels formed in the areas of location of the laser filaments produced as a result of multiple self focusing. Starting the formation of the filaments is at a distance from the crystal surface which corresponds to the effective length of the self focusing. It is known that effective self-focusing length largely determined by the intensity of the laser radiation. In our studies, the intensity of the laser radiation is determined by the distance from the focus position of the lens to the sample surface. This dependence has been compared with the results of computer modeling of filamentation based on the nonlinear Schredinger equation.

So, the more rapid decay of laser pulses on the filaments in the case of ceramics, where initial inhomogeneities in the profile of the beam amplified inhomogeneities of the medium leads to the fact that the self focusing length is less than that of a monocrystal. The dependence of the self focusing length l from the distance L between the input surface and the focus lens is close to linear.

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MULTIPLE FILAMENTATION OF LASER BEAMS WITH DIFFERENT DIAMETERS IN THE AIR AT A 150-METER PATH

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Results of experiments on controlling the position and length of the filamentation zone of femtosecond laser pulses in atmospheric path length 110 m using different initial spatial focusing and defocusing. The obtained distribution of filaments along the filamentation zone, measured dependence the length of the filamentation zone of the numerical aperture of the beam, its initial radius and pulse power. Work was financially supported by the Russian Science Foundation (Agreement No. 15 17 10001).