Diploma thesis abstract

Amplification and nonlinear transformation of ultrashort laser pulses in photonic crystal fibers with complicated structure of core

In this diploma the formation of the in-phase mode with big mode area (up to 5000 μm^2) in a sevencore microstructured fiber, doped with ions of ytterbium, was shown. In fibers of this type an amplification of picosecond pulses up to peak powers of the order of 9 MW is possible. Time compression allows to achieve peak powers up to hundreds of megawatt with durations less than 100 fs. Results of numerical experiment were brought into comparison with an experimental data, received by scientific group from Tianjin university.

Numerical simulation of the process of laser ultrashort pulse (95 fs) propagation in a microstructured fiber based on numerical solving of nonlinear Schrödinger equation has been realized. The possibility of supercontinuum generation with spectral width from 600 nm to 1600 nm has been demonstrated, this value corresponds to fourier-transform limited pulse with duration τ=6 fs. The theoretical results were compared with an experimental data. The value of supercontinuum energy at the output of the fiber was found to be E=22 nJ and a corresponding power equals P=3.67MW . This fact enables the usage of multicore fiber as a source of high power supercontinuum.

Scientific adviser: d.p.- m. s. A. M. Zheltikov

author: A. J. Tashchilina