**Diploma thesis abstract**

**Kachan E.P.**

**scientific advisor Kandidov V. P.**

# Filamentation of femtosecond laser pulse upon coherent scattering by atmospheric aerosol. Computer simulation

Diploma thesis is about the investigation of phenomenon of high power femtosecond laser pulse filamentation upon coherent scattering by atmospheric aerosol by means of computer simulation.

Based on stratified model of direct propagation of laser light in dispersive medium the role of coherent scattering by ensemble of aerosol particles in initiation and formation of filaments in laser pulse was studied. It was found out that at high power of light interference maxima of intensity appearing during scattering of light by aerosol particles can become the centers of filaments initiation. By means of statistical experiments boundaries of different regimes of laser light filamentation depending on particles sizes and concentration were distinguished. It was shown that the increase in the particle concentration results in a passage from the multiple filamentation to one-filament regime and at the same time the distance to the onset of filaments becomes larger. During the further increasing of concentration dissipation of light due to scattering begins to dominate over nonlinear focusing and no filamentation occurs.

It was shown that in no-filament and one-filament regimes it is allowed one to estimate statistical analysis based on determined problem of pulse propagation in linear damping medium with equal to dispersive dissipations.

Dynamic of filaments formation in laser pulse with a peak power 50 as large as critical power of self-focusing in air was investigated in monodispersive aerosol with particles concentration $N = 100 - 300\ cm^{-3}$. It was shown that lengthy filaments and plasma channels generates under such conditions.