Supercontinuum upon the filamentation in fused silica of femtosecond laser radiation of different wavelengthes

Annotation

Formation of frequency-angular spectrum of supercontinuum emission observed upon the filamentation in fused silica KU-1 of femtosecond laser pulses on different wavelengthes was studied experimentally and numerically.

The influence of the wavelength of femtosecond laser pulses on the generation of supercontinuum and conical emission upon filamentation in fused silica was considered. Main attention was paid to investigation of formation of frequency-angular spectrum of conical emission along the filament under invariable parameters of pulses. Such research definition allows us to investigate the mechanism of formation conical emission in the process of femtosecond laser pulse propagating upon filamentation under the same conditions of Kerr self - focusing and defocusing of the pulse in filament plasma.

As a result of the comprehensive numerical and experimental analysis, it was ascertain, that the mechanism of formation of supercontinuum frequency-angular spectrum is regulated by the interference of supercontinuum emission, that generates upon femtosecond laser pulse filamentation. Interference of supercontinuum emission have a general character, it exist at different material dispersion, and it is a reason of the appearance of fine structure in spectrum upon the pulse splitting, formation of lengthy radiation source in filament. Also interference of supercontinuum emission is a reason of the formation of discrete rings of conical emission under pulse refocusing.

The shape of pulse frequency-angular spectrum is determined by material dispersion of medium. In region of normal group velocity dispersion (GVD) the frequency-angular spectrum in coordinates (θ,λ) have so-called X - shaped form, in region of zero GVD it have Fish - shaped form , and in region of anomalous GVD the frequency-angular spectrum have O - shaped form.

graduate work

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