FILAMENTATION IN THE INTERSECTION REGION OF TWO FEMTOSECOND LASER BEAMS IN SAPPHIRE

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S u m m a r y

The filamentation phenomenon arising at the intersection of two femtosecond laser beams in a sapphire single crystal has been studied. Conditions for a regular multifilament structure (MFS) to emerge with the parameters depending on the pulse energy, intersection angle, and phase difference between two exciting beams are determined. For the first time, the formation of a single filament under the action of two different excitation beams is analyzed as an MFS implementation. The number of filaments in the MFS is demonstrated to depend on the number of interference maxima in the intersection region of beams, the power of which exceeds the critical power of self-focusing. Attention is paid to the possibility to control the multifilament structure by varying the phase difference between the interacting beams. Optical manifestations of the interaction between the filaments with the "attractive" or "repulsive" character are observed. The spectrum of the axial emission by a single filament, as well as its dependence on the filament length, is studied, and the process of four-wave mixing is shown to play a key role in its formation.