FORMATION OF THE SCATTERING PHASE FUNCTION IN THE INTERACTION OF ULTRASHORT LASER PULSES WITH A DROP IN A NONLINEAR MODE*

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The propagation of ultrashort laser pulses in the atmosphere is accompanied by nonlinear effects. The most low-threshold of them is the effect of cubic nonlinearity manifesting in aerosol. This effect should lead to the transformation of the scattering phase function formed in a liquid droplet aerosol. To study this effect, numerical and experimental studies on droplets of various sizes and geometries were carried out. As expected, the cubic nonlinearity inclusion should lead to an increase in the effect of backward scattering. However, as our preliminary experiments show, this does not always happen. Fig. 1 shows the results of experimental studies on the scattering of femtosecond laser pulses from a drop.

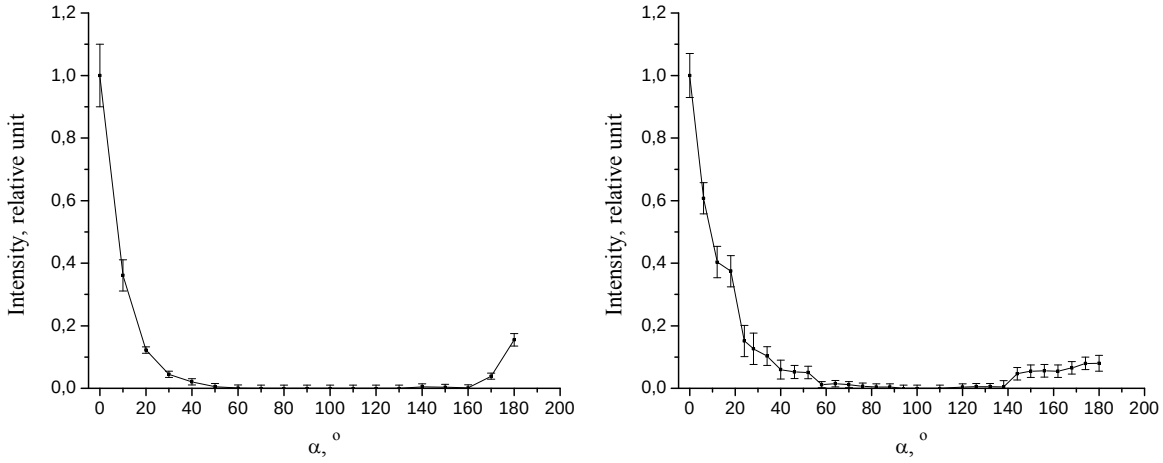

Fig.1. The distribution of the amplitude of the scattering signal as a function of the angle relatively to the drop (the drop diameter d = 1.6 mm) at pulse energy of 0.16 mJ (a) and 0.4 mJ (b)

As can be seen from the fig. 1, contrary to the expectations, the scattering phase function decreases with the manifestation of nonlinear effects in the backward direction. This effect requires further theoretical and experimental research.

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