

INVESTIGATION OF THE THIRD-HARMONIC GENERATION IN THE FIELD OF Ti:Sa FEMTOSECOND LASER RADIATION IN β -BaB₂O₄ CRYSTAL THROUGH THIRD-ORDER SUSCEPTIBILITIES

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The process of the third harmonic generation (THG) attracts high scientific interest today and has its applications in spectroscopy, medicine and other spheres [1].

Many peculiarities of the THG process in crystal media which is pumped by the radiation of the femtosecond Ti:Sa laser have not been studied deeply enough by now. For example, such aspects as the influence of plasma formation on the modification of the reflective index and nonlinear susceptibilities of the media [3], phase matching disturbance and the decrease of the effectiveness of the THG process which result from the occurrence of the nonlinear phase incursion, require additional investigations.

The present work studies the transformation of the femtosecond Ti:Sa laser radiation with the wavelength of 780 nm into the third harmonic radiation in the BBO crystal, which is due to the nonlinearity of the third order; the results of the time dependence of the generated light of the THG are presented; the investigations of the effectiveness of the THG process in the focused beams of the incident radiation as well as in the parallel beams are carried out.

The results of the investigation of the angular dependent THG intensity are presented in the picture given below.

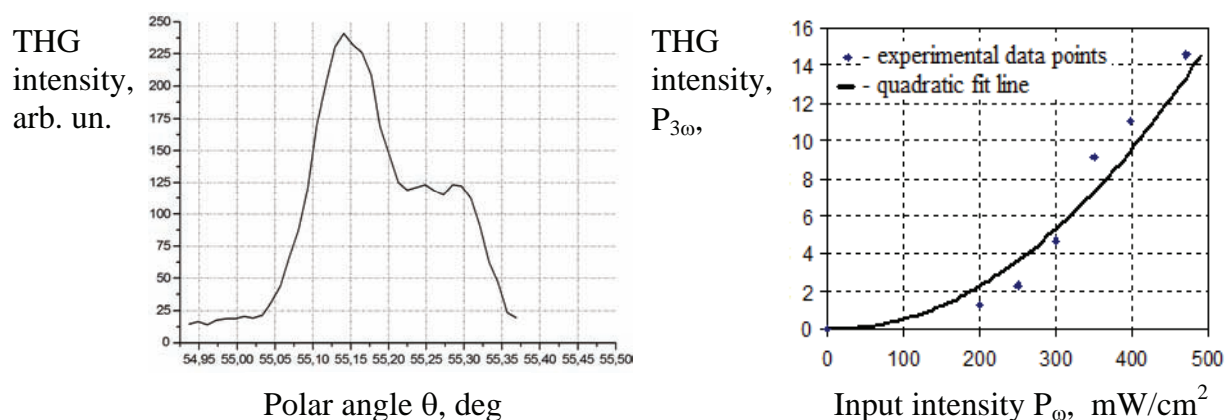


Fig. 1 a) - Angular dependence of the THG intensity; b) - Experimental dependence of the THG intensity on the intensity of incident light

References

- [1] P.S. Banks, M.D. Feit, and M.D. Perry, "High-intensity third-harmonic generation in beta barium borate through second-order and third-order susceptibilities", *Optics Lett.* 1, 4-6 (1999).
- [2] P.S. Banks, M.D. Feit, and M.D. Perry, "High-intensity third-harmonic generation", *J. Opt. Soc. Am. B* 1, 102-118 (2002).
- [3] W. Ubachs, "Nonlinear Optics, Lecture Notes", Laser centre vrije universiteit amsterdam, 2007. – 85p.