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ABSTRACTS

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(Fig. 1(a)), we show that in contrary to the free space scenario the radiation patterns have flat uniform wavefronts (Fig. 1(b)). The dipole paves a way for investigation more complex geometries. Fig. 1(c,d) shows the electromagnetic scattering in the empty cloak and the one with an object inside. The similarity between transmitted wave fronts verifies the validity of the general concept.

References

[1] J. B. Pendry, D. Schurig, D. R. Smith, Science 312 1780, (2006).

[2] U. Leonhardt, Science 312 1777, (2006).

Femtosecond Faraday evolution in one-dimensional photonic structures

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Faraday effect is a phenomenon widely used for light propagation control. The effect is non-reciprocal and proportional to the thickness of a magnetic medium. Thus, it can be enhanced in multilayered structures with artificial dispersion and group delay, such as magnetophotonic crystals. In case of short femtosecond laser pulse its front part interacts with the structure less effectively than the rear one. Until now, however, ultrafast dynamics of magneto-optical effects has always been connected with magnetization changes. The goal of the work is to demonstrate Faraday effect evolution caused by the pulse interference in the layered structure.

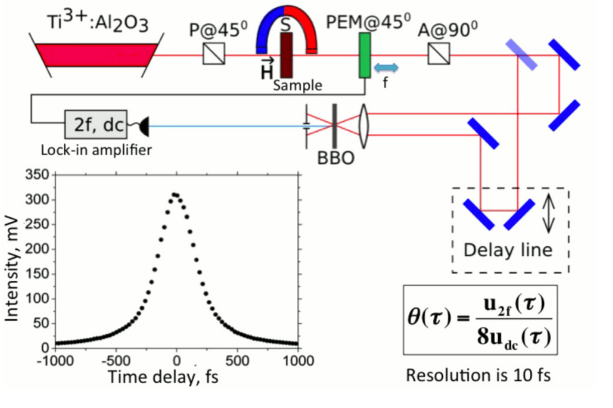

Fig. 1: Up: Experimental setup consists of correlation technique, augmented with polarization-sensitive elements. Down: Autocorrelation function of the laser pulse.

To detect the time dependence of Faraday rotation, autocorrelation technique has been used (see Fig. 1). We measured autocorrelation function of the 130-fs laser pulse with tunable central wavelength, which passed through magneto-photonic crystal with the center of microcavity mode at the 895 nm. We detected ultrafast Faraday rotation dynamics in a magnetophotonic microcavity. It is caused by the pulse self-interference inside its layers. The character of dynamics strongly depends on spectral position of the pulse central wavelength due to the strong artificial dispersion of the medium. The time derivative of Faraday rotation is the greatest when pulse central wavelength is at the center of microcavity mode and much less when it is in the vicinity of this point.

References

[1] A. V. Chetvertukhin, M. I. Sharipova, A. G. Zhdanov, T. B. Shapaeva, T. V. Dolgova, A. A. Fedyanin, *Journal of Applied Physics*, **111**, 07A944 (2012).

[2] A. I. Musorin, P. V. Perepelkin, M. I. Sharipova, A. V. Chetvertukhin, T. V. Dolgova, A. A. Fedyanin, *Bulletin of the Russian Academy of Sciences. Physics*, **78**, 43–48 (2014).