

新型液晶レンズ

New Liquid Crystal Lens

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The optical properties of current liquid crystal (LC) lens with a highly resistive (HR) film [1] usually change with time, owing to the surface resistance (approximately in the order of $10^8 \text{ M}\Omega/\square$) of the HR film is unstable. This makes the mass production of the LC lens difficult. Ooba, et al, has proposed an electrode structure to produce axially symmetric electric field in a twisted LC layer to form a diaphragm [2]. Here we realize a new LC lens using the structure, and the properties of the LC lens are tunable by amplitudes and phases of the applied voltages. The main advantages of the LC lens are that the properties of the lens is independent of the resistance of the HR films and as a result, the properties of the LC lens are stable, and that the focus can be driven electrically to move not only along the optical axis of the lens but also in focal plane [3, 4].

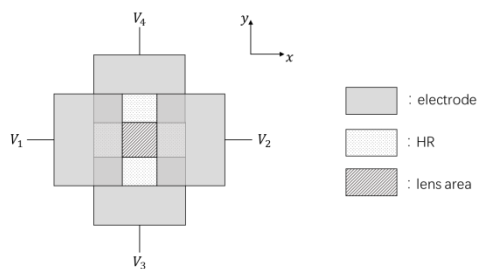


Fig. 1 Cell structure

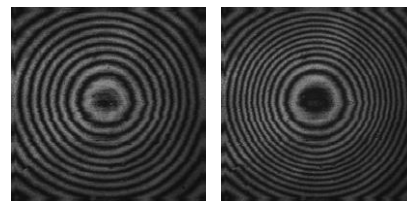


Fig. 2 Interference fringes changing with phase

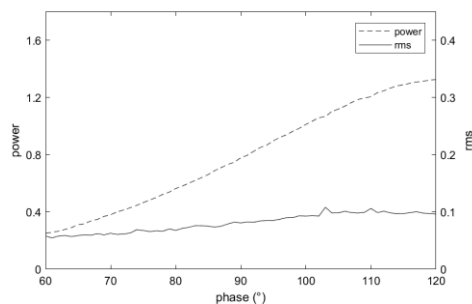


Fig. 3 Power and rms aberration

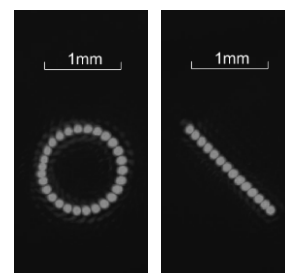


Fig. 4 Focus moves in focal plane

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[1] M. Ye, et al, Jpn. J. Appl. Phys. 49 (2010) 100204-1. [2] Y. Ooba, et al, Proc. SPIE 0639, Optical Information Processing II, (24 September 1986). [3] M. Ye, et al, Opt. Commun. 259 (2006) 710. [4] 北川 真, et al, 第56回応物(春) 2a-H-4, pp.1026 (2009).