Abstract Submitted for the OSS05 Meeting of The American Physical Society

Adaptive Optical Beam Shaping Using Hybrid Acousto-optics YASSER ABDELAZIEZ, ECE Dept., University of Dayton, DEAN EVANS, Air Force Research Laboratory, Materials and Manufacturing Directorate, Wright Patterson Air Force Base, PARTHA BANERJEE, ECE Dept., University of Dayton — We theoretically and experimentally demonstrate optical beam shaping through adaptive feedback in an acousto-optic device with electrical feedback using experimentally determined parameters. Cases of positive and negative feedback from undiffracted and diffracted orders are investigated. In addition, we demonstrate the dependence of the final value of the induced grating strength in the acousto-optic cell on the feedback parameters. Feedback, as used now, helps to generate the additional sound pressure which can give beam shaping. Previous analysis of hybrid acousto-optic devices with feedback have been restricted to plane wave treatments only. We show that over a region of convergence, one can achieve beam shaping by using the detected optical output and feeding it back together with the external electrical input. This is fundamentally different than just increasing the electrical input to the transducer. In general, we can also select a certain range of spatial frequencies at the optical detector and use this for feedback purposes, this way, we are selectively feeding back a range of spatial frequencies of the optical beam.

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Date submitted: 18 Mar 2005

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