

Coherent Communication, Imaging and Targeting: Phase Plate Characterization

Oscar Armando Azucena

Lawrence Livermore National Laboratories

Senior Scientist Advisor: Scot Olivier

Research Supervisor: Kevin Baker

Home Institution: University of Houston

Turbulence in the atmosphere causes aberrations in traveling plane waves. The Coherent Communication, Imaging and Targeting (CCIT) project uses adaptive optics to propagate a laser light through the atmosphere and compensate for the resultant aberrations. In this system, the transmitter aims a laser at the target and the target returns the laser. The returning light is then processed to identify atmospherically induced aberrations in a process which produces a hologram that is applied to a Spatial Light Modulator (SLM). The outgoing laser is then reflected off the SLM and sent to the target with the corrected wavefront. The CCIT system was simulated in a controlled environment. Four phase plates were etched with a phase distribution with a Kolmogorov power spectrum. The phase plates were characterized by observing the phase structure function and the temporal power spectrum. The results obtained from these observations agreed considerably on the value of Fried parameter, r_0 , of ~ 1.7 millimeters. The next step on the characterization of the phase plates is to compare them to an atmospheric path in an uncontrolled environment.