THE
CATHOLIC UNIVERSITY
of AMERICA

EECS Seminar

ADAPTIVE DIGITAL HOLOGRAPHY FOR GAIN-ENHANCED IMAGING

Presented by:

Dr. Abbie T. Watnik
Research Physicist in the Applied Optics Branch in the Optical Sciences Division
at the Naval Research Laboratory in Washington, DC

DATE: Thursday, October 23, 2014
TIME: 2:00 pm to 3:00 pm
LOCATION: Pangborn Hall, Scullen Room (First floor)

ABSTRACT

In an active imaging system, a laser source provides illumination to the object of interest. If the target is extended yet sparse, a significant portion of the power is wasted in the voids of the illumination area; only a fraction of the total power is actually reflected back from the target. Additionally, if there are strong background components, the return signal is further corrupted since the illumination beam is reflected from both the background and the target. One approach to address these issues is to appropriately use wavefront shaping of the illumination beam to illuminate only the object of interest.

We describe an iterative feedback, digital holography experiment using a spatial light modulator to provide wavefront shaping and control. In addition to the in-the-loop hardware components, an algorithmic technique to provide uniform illumination to the target is utilized to prevent oversharpening. Results are presented for this adaptive holography arrangement that demonstrate energy-on-target gain enhancement with increasing iteration.

Biography

Dr. Watnik received her B.S. in Electrical Engineering from Colorado State University and her M.S. and Ph.D. in Optics from the University of Rochester. She is a former NSF Graduate Fellow. Currently she is a Research Physicist in the Applied Optics Branch in the Optical Sciences Division at the NRL.

Dr. Watnik's expertise is in Fourier optics, diffractive imaging, aberration correction, holographic and active imaging for intelligence, surveillance and reconnaissance (ISR) systems. Dr. Watnik is a member of the OSA and the SPIE. She has served as a committee member for the OSA Imaging Systems Technical group and the National Research Council, a grant reviewer for the OSA Foundation and the Mustard Seed Foundation, and a panelist for the National Science Foundation.

All are welcome to attend.