

SEEING AROUND CORNERS

ZEPLER INSTITUTE INVITED LECTURES



Biography

James Leger is Professor of Electrical Engineering at the University of Minnesota, where he holds the Cymer Professorship for optics research. His research group works in the area of optical design, including coherent laser beam combining and the design of gradient index optics, and information optics, including the design and analysis of imaging systems using light from scattering surfaces. Prof. Leger is senior deputy editor of Optics Express and has served on the Board of Directors of the OSA. His awards include the OSA's Joseph Fraunhofer Award/Robert M. Burley Prize, and the George Taylor Award for Outstanding Research. He has also been inducted into the academy of distinguished teachers at the University of Minnesota. He is a Fellow of the OSA, IEEE, and SPIE.

Seeing around corners in natural light using plenoptic observations

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Abstract

Several methods have been proposed to solve the problem of “seeing around corners”, where light scatters from a rough surface before it is observed. Although active methods (using, for example illumination with short pulses of laser light) have proven quite effective, they have the distinct disadvantage of being non-covert. In this presentation, we restrict the imaging problem to using only natural light. We examine the efficacy of plenoptic measurements, where the entire four-dimensional radiance function of the scattered light is measured. We quantify the amount of information that is contained in the scattered light and propose several approaches for extracting data from the plenoptic signal. We show that by using a synergistic relationship between the angular and spatial components of the plenoptic function, one can retrieve significant information from the scattered signal, including the three-dimensional location of specific objects and, in some cases, complete image recovery.

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