Metasurface-enabled Advanced Imaging and Display

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Metasurfaces are planar arrays of subwavelength electromagnetic structures that collectively mimic the functionality of much thicker conventional optical elements, and are considered as promising solutions for various advanced imaging and display applications. In this talk, I will present our recent works on metasurface-enabled advanced imaging and display. I will first present our recent efforts of implementing all-optical differentiators using dielectric metalenses, which perform spin-multiplexed arbitrary-order differential operations over the light field of the imaging scene. I will then present a new type of waveguide-based six-channel metaholograms simultaneously multiplexed by the spin and azimuthal angle of an incident guided light. Six target images can be encoded in the evanescent region of the metahologram's k-space, and they can be respectively displayed utilizing k-space translation strategy under guided light illumination with selected spin and azimuthal angle, without any crosstalk. Finally, I will present our recent investigation of waveguide-based metaholograms multiplexed by diffraction orders.