Docket #: S15-229

Spatially Multiplexed/interleaved Dielectric Metasurface Optical Elements

This invention facilitates the realization of optical elements with spatially multiplexed/interleaved phase profiles to achieve a high packing density of distinct optical elements on a surface. These new optical elements can achieve new and/or improved optical functionalities that are currently unreachable by conventional optical components. The interleaved optical metasurface elements are compact, lightweight and can perform multifunctionality in the same physical space. The researchers believe this is the first demonstration of ultrathin, single height optical elements.
The phase profile design of metalenses was implemented using dielectric gradient metasurface technologies described in Stanford docket S13-484 and US Patent 9,507,064. The design principle can be applied across a wide range of frequencies, and to control other wave phenomena such as acoustics waves.

Stage of Development

- Proof-of-Concept

Applications

- **New applications** such as compact imaging systems enabling new medical systems and implantable cameras
- **Improvements to current applications** including but not limited to: flat lenses with unique, polarization-dependent optical functions, light field microscopy, multi-angle stereoscopic image capture
- **Commercial application** in various industries including but not limited to: optical microscopy, light field digital cameras, wearable devices, display devices, medical imaging, and solar energy harvesting.

Advantages

- **Higher performance** - Spatial multiplexing can lead to performance increases over existing optical elements
- **Ultrathin, lightweight, with small footprint**
- **Compact and efficient** - Interleaved optical metasurface elements can perform large number of combined or separate optical functions per unit area while retaining positive performance aspects associated with large area optical elements
- **Multifunctionality in the same physical space**
- **Easy integration** - The phase profile of wavefront coded phase plate can be easily added into the design of metalens
- **Reduced optical aberrations**

Patents

- Published Application: 20170219739
- Issued: 10,126,466 (USA)

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